MAR 24 1945

Insure VICTORY ... — Buy Bonds for War ... — Push Plans for Peace

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Contractors and Engineers Monthly

Vol. 42, No. 3 MARCH, 1945 $3 a Year, 25 Cents a Copy

Covering the Field

Old Bridge Replaced
An obsolete bridge on an access road near Houlton, Maine, was recently replaced by a new reinforced-concrete span. The story starts on this page.

Maintaining Our Highways
The methods of controlling slides and erosion used in California, described on page 1; the arrangements for state highway maintenance in Wisconsin, outlined on page 21; contract-sealing in Minnesota, described on page 59; and the salvaging of New York state highways by resurfacing with bituminous macadam, see page 79, are covered in articles which maintenance men will find of interest and value.

Levee Enlargement
The repair and enlargement of flood-damaged levees in East Peoria, Ill., in order to protect vital war industries are described on page 2.

Highway Reconstruction
The improvement of the main north-south divided highway in Delaware by concrete patching, widening one roadway, and resurfacing it with bituminous concrete is described on page 2. An article on laying a new concrete surface on an old concrete road in Illinois appears on page 11.

County Road Work
An outstanding article on the organization, equipment, and general activities of the Alameda County, Calif., Highway Department appears on page 6; while a contract for widening and resurfacing a Wayne County highway in Detroit, Mich., is described on page 54.

Airport Projects
On page 14 appears an article on Cincinnati's plans for its post-war airports; the contract for the extension of facilities at the Army Airfield at Roswell, N. M., including the improvement of surface drainage and hot-mix paving of runways, is described on page 29; and an interesting glimpse into the construction of the Saipan Air Base is given on page 41.

Burma Road Reopened
On January 25, the first convoy of trucks started over the Stilwell Road to China. This route combines the new Ledo Road and part of the old Burma Road, which was reconstructed by the Chinese, with American engineering aid. The story of the reconstruction of the Burma Road is told on page 25.

Highway Legislation
The importance of highways and the necessary legislation required to make possible needed highway construction were discussed in gubernatorial messages to most of the forty-two state legislatures meeting this year. A summary appears on page 63.

(You will find "In This Issue" on page 87)

Construction Volume Will Be Low in 1945

Preliminary estimates of new-construction volume in the United States in 1945, based on the assumption that war on both fronts will continue throughout the year, indicate a new 10-year low of $3,250,000,000, according to the War Production Board. The estimated 1945 activity is 82 per cent of the 1944 volume and 24 per cent of the peak 1942 performance. Almost half of the 1945 volume will be accounted for by privately financed work, as contrasted to 40 per cent in 1944 and 20 per cent in 1942 and 1943.

Construction to meet military requirements is expected to be about one-third less in 1945 than in 1944, both for industrial and non-industrial work. Activity in the construction categories for essential civilian and indirect war pur-

(Concluded on page 49)

A New Bridge Built By Seven-Man Crew

Labor Shortage in Maine Forces Hector J. Cyr to Use Small Crew on Concrete Structure in So. Houlton

✦ BECAUSE of the acute labor shortage, Hector J. Cyr, Inc., Waterville, Maine, contractor, was able to employ but seven men in the construction of a new 33-foot-span reinforced-concrete T-beam bridge over the Hodgdon stream 2½ miles southwest of Houlton, Maine, on Route 2A, the military road from Bangor to Houlton. The former bridge, a reinforced-concrete structure built by the town, was declared unsafe because of a shearing action occurring in the deck slab. This was caused, engineers believe, by a combination of faulty design in the placing of steel reinforcing, too heavy reinforcing, the use of a poor grade of sand, and inadequate protection of the concrete during cold-weather construction.

The concrete abutments of the old bridge, though somewhat scaled on the face, were in fair condition and rested on a good foundation of ledge rock. Designing engineers of the Maine State Highway Commission decided to use these old abutments by adding a new facing of 1-foot-thick reinforced concrete and new wing walls. Four feet of concrete was broken off the top of the abutment walls which were then built up again with 2 feet of new concrete integral with the new facing and wing walls.

Temporary Bridge

Before any demolition on the old bridge could begin, a temporary bridge had to be built to maintain traffic. This timber bridge was 70 feet long built on nine four-log bents, each sway-braced and spaced at 7-foot intervals, and resting on mud sills. The logs were about 6 inches in diameter on top and 8 to 10 inches on the bottom. The bents were capped with 8 x 8-inch timbers, on top of which ran seven 8 x 8-inch stringers lapped at the caps. The floor was made of 2 x 6 planks, forming a 14-foot-wide roadway. Safety rails of 2 x 6-inch planks were laid on the floor to protect vehicular traffic. A 2 x 4 hand-rail was erected at the sides for pedestrian protection.

Four men built this temporary bridge which carried loads up to 10 tons. When it was built in early May, 2 feet of water was going through the stream on the way to join the Meduxnekeag River, so construction was carried on from a staging built on the bents.

Removal of Old Bridge

With traffic accommodated, the 18-inch-thick deck of the old bridge, topped by a 1-foot layer of gravel, was removed. The gravel was shoveled off and stored, and 300 holes 9 inches deep were drilled in the concrete deck by an Ingersoll-Rand jackhammer. Ten holes at a time were filled with ¼ stick of 40 per cent dynamite each and fired. Blasting was finished in five days but not before Fer-

(Concluded on page 22)

Wood Piles Check Slides in Calif.; Mulch and Rye Control Erosion

✦ DISTRICT No. 1 of the California Division of Highways, with headquarters at Eureka, includes many miles of sidehill highway construction along the coast as well as a considerable mileage through the redwood groves of the area. In the past much difficulty has been experienced from slides, both those from above which block the highway with debris and those below which cause subsidence of the grade and consequent damage to the surface. Recent experiments in treatment for the correction of slides have been made which appear to promise satisfactory results with worth-while economy.

The type of treatment to be used is determined after subsurface exploration is made by means of borings. In the past the methods of treatment included the following: excavation to the slip plane, wasting the unstable material above it, and backfilling with a gravel open enough to provide an outlet for ground water without the creation of a lubricated plane of slippage; excavation of a trench or system of trenches to a depth below the slip plane, wasting the excavated trench material, placing underdrain pipes, and backfilling the trenches with pervious material to allow free escape of subsurface water; unloading a portion of the slide by means of benches; and in some cases installation of horizontal drains by the Hydrauger method.

Pile Treatment of Slides

These types of treatments are effective but costly, so experiments in other means of slide correction were made. On one section of highway about 500 feet long where movement of the sidehill fill had occurred on a slip plane 12 to 16 feet below the original ground on which the fill had been constructed, untreated timber piles were driven 4 to 6 feet away from the downhill toe of the fill slope and between it and the upward bulge formed by the slipped material. It had been hoped that a penetration of 15 feet below the slip plane could be secured

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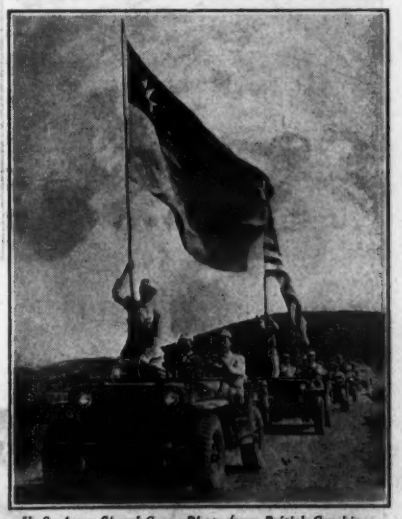
ON THE BURMA ROAD



U. S. Army Signal Corps Photo from British Combine

With Chinese and American flags flying, Allied troops move into recaptured Lungling on the Burma Road during the Salween campaign to drive out the Japs. The story of the reconstruction of the old Burma Road, which, with the Ledo Road from India, has been renamed the Stilwell Road, is told on page 25.

Damaged River Levee In East Peoria, Illinois, Repaired by Contract

Earth Levees Damaged During May, 1943, Flood, Enlarged on 3.1-Mile Front In 1944

By WILLIAM H. QUIRK,
Eastern Field Editor

✦ THE rampaging waters of the Illinois River rose to unprecedented heights during the latter part of May, 1943, when spring floods all but burst through the 3.1-mile-long earthern rampart which practically encloses East Peoria, Ill., on three sides. Only the unceasing efforts of 15,000 employees of the Caterpillar Tractor Co., whose main plant lies in a corner of the levee, the employees of other East Peoria industries, and Government employees of the U. S. Engineer Office at Peoria prevented a breakthrough which would have resulted in great property damage to East Peoria and the tractor plant, a halt in the production of vital equipment for the war effort, and possible injury or loss of life to the workers who were pitting their united skill and strength against the sullen challenge of a great river unchecked in its flow. From May 20 to 24, when the crisis had passed, over 250 pieces of earth-moving equipment had been operating 24 hours a day reinforcing the water-soaked levee, which was also strengthened with over 1,500,000 sandbags. These bags were placed by hand on the slopes and top of the levee, and successfully resisted the rising water when it crept above the former level of the great earth dike.

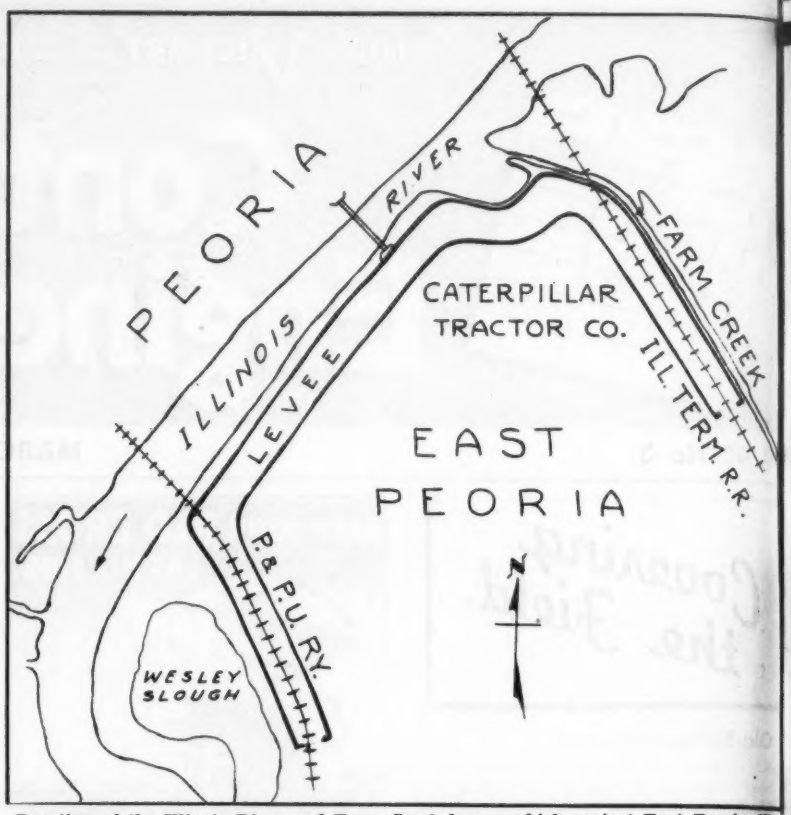
When the river finally subsided and again followed its normal channel, the damage it had wrought could be observed. The levee had to be strengthened by increasing the area of its cross section both in width and height. Pursuant to Congressional authority for improvement of these levees contained in the Flood Control Act approved June 22, 1936, and with the approval of the War Production Board for construction to protect a strategic manufacturing area, two contracts were let by the Engineer Corps, U. S. Army, in 1944 for the improvement of the levee along the left bank of the Illinois River which at this point flows in a southwesterly direction, separating Peoria on the right bank from East Peoria on the opposite side.

Farm Creek Levee

One contract was for the improvement of the upper flank levee bordering Farm Creek, a tributary of the Illinois, which flows northwest through East Peoria and empties into the river just below the Franklin Street free bridge. On top of this levee are carried three tracks of the Illinois Terminal Railroad System which company received the contract to improve this 3,800-foot section on its low bid of $40,000. The levee was raised only under the main-line track which borders the water side, and the increase in height varied according to the condition of the levee, with a maximum addition of 5 feet of material. The other tracks were raised only at switch points where they connected with the main-line track.

Using its own equipment and track crew of twenty-five men, the railroad began work on August 14, 1944, and completed the improvement by the end of October. The levee was built up with approximately 20,000 short tons of sand transported in gondola cars from a commercial sand and gravel pit in Chillicothe, 20 miles north of Peoria. The cars discharged their loads as they moved slowly over the rails, and then the track crew raised ties, tracks, and signal system to the top of the new fill. Overhead catenary construction for this electrified railroad also had to be elevated to correspond to the raised roadbed. About 5,000 short tons of gravel ballast from the same source as the sand was later placed under the ties. No special equipment was used in this construction as the regular tools from the railroad work car were sufficient. However, a Traxcavator on a D4 Caterpillar tractor, and a ½-cubic-yard Bucyrus-Erie dragline were used to place an impervious blanket along the outside slope of the Farm Creek levee.

Left, citizens of East Peoria, Ill., build an embankment of sand bags to fight the unprecedented 1943 spring flood of the Illinois River. The damage from the flood necessitated the strengthening of the levees which protect the industrial center of East Peoria. Below, left, a Traxcavator on a D4 prepares the inside slope of the improved Farm Creek levee for seeding. At right, while a Bucyrus-Monighan 5W dragline builds up the Illinois River levee in the background, a Caterpillar diesel tractor and bulldozer spreads and compacts the material on the land-side slope.



Location of the Illinois River and Farm Creek levees which protect East Peoria, Ill.

Enlarging Main Levee

The principal improvement was to enlarge the main levee fronting on the Illinois River from its connection with the Farm Creek levee to a point over 1½ miles downstream, where it makes almost a right-angle turn at the river bridge of the Peoria & Pekin Union Railway and continues ¾ mile along the low-lying marshy inlets following a sharp bend in the Illinois. A contract for placing 352,000 cubic yards of embankment was awarded to the S. W. Hardwick Co. of Beardstown, Ill., for approximately $187,560, and the task of enlarging the levee was begun on May 31, 1944, a year after the record flood. An average of twenty-four men was employed on this contract under the direction of Arnold Hardwick, Superintendent.

Material for the improvement came from the shallow river bottom along the front of the levee, making it unnecessary to haul in fill for any distance. The pool elevation of the Illinois River at Peoria is 440 feet above mean sea level. A 300-foot channel, 9 feet deep, had been dug in the center of the river, which is about 1,000 feet wide at this location, but between the channel and the levee the river was shallow and furnished all the necessary borrow. The slope from the river to the toe of the old levee was practically flat. Then it rose about 1 on 3 to a narrow crown a few feet in width, with a profile of varying elevation, but in only a few places was it higher than Elev. 458. The inside slope of the levee was about 1 on 3. The new levee section required excavating the river bottom to Elev. 430 from which point a 1 on 3½

(Continued on page 81)

Delaware-U. S. 13 Repaired, Widened

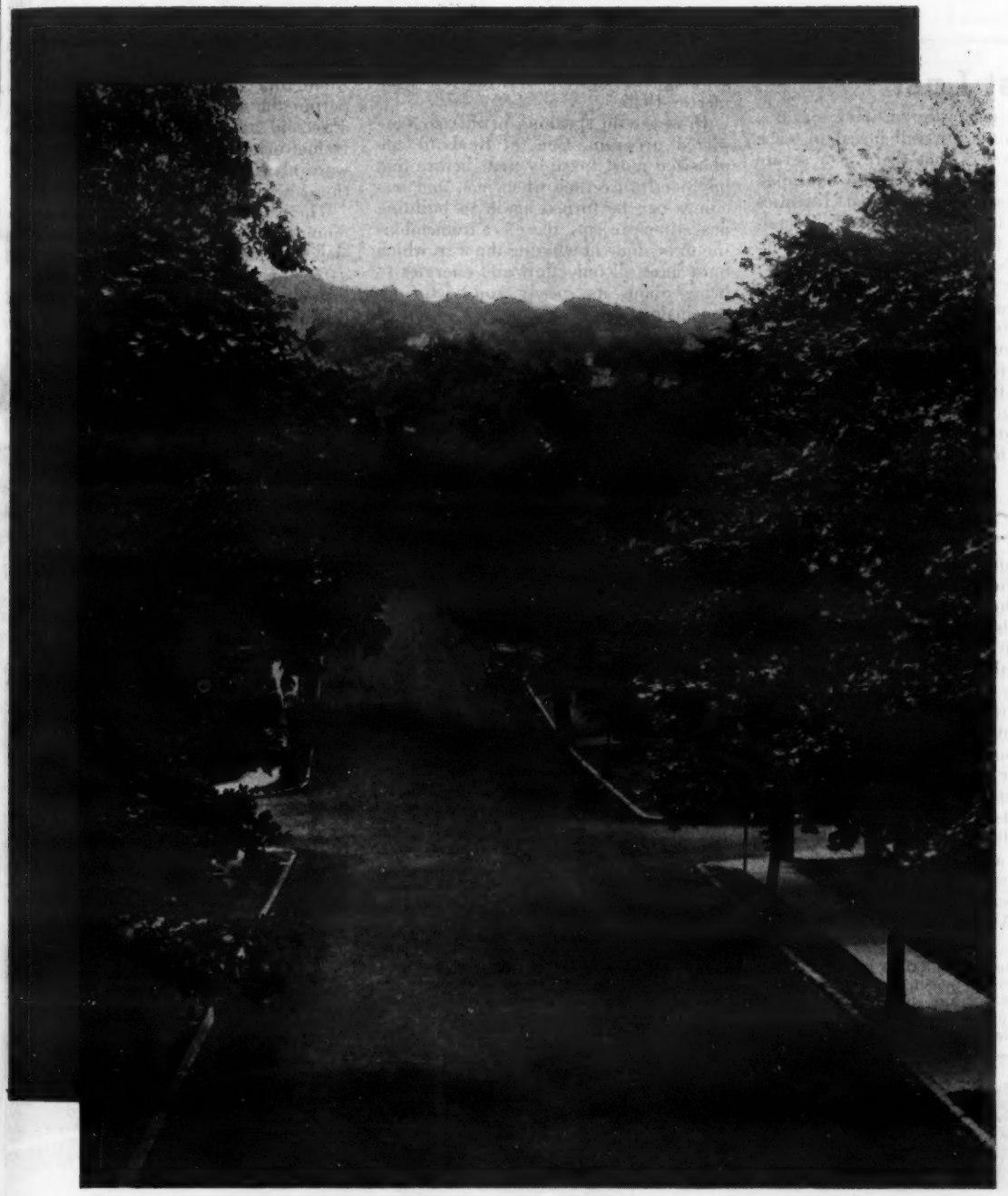
Important North-South Artery Is Salvaged for Resurfacing With Hot-Mix by James Julian, Contractor

✦ THE main north-south dual highway running through the state of Delaware, U. S. 13, is being reconstructed in the northern part for 5.4 miles along the southbound roadway between St. George and Odessa. The improvement consists of patching the 25-year-old concrete road, widening the pavement 4 feet, and then in the spring of 1945 to cover the paved area with a 2-inch surface course of bituminous concrete. The dual highway of one 18-foot and one 20-foot concrete pavement, is in good shape on the northbound side which was built around 1935, but the original 18-foot southbound roadway was badly in need of repairs.

Contract reconstruction on this important artery was started on September 6, 1944, by James Julian, Wilmington, Del., contractor. The initial phase of the project was the patching of about 3 per cent of the old 8-6-8-inch plain concrete pavement with plain concrete of 8-inch uniform thickness. The southbound lane was closed to traffic during the construction period but no inconvenience resulted as the northbound lane

(Continued on page 43)

The lasting smoothness you want from your pavement



Texaco Sheet Asphalt pavements keep their original smoothness for years because they are resilient, joint-free.

Pavements which hold their original smoothness through years of hard service have important advantages both for those who build them and those who use them. The fact that a smooth pavement is subjected to less traffic impact than an uneven one results in a lower maintenance cost. From a motorist's standpoint, the pavement which successfully maintains its smoothness gives him lasting driving comfort, with a minimum of wear and tear on his car.

Principally because of their resilient, joint-free qualities, Texaco Asphalt pavements have been demonstrating an exceptional ability to preserve their original smoothness for the past 40 years. Today, thousands of square yards of 25 to 30-year-old Texaco-paved streets and roads still possess an easy-riding quality, superior to that of many a pavement not half as old.

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Your Tractors Must Last

With the expectation of a speedy cessation of hostilities in Europe faded, and the reported military demand for track-laying tractors remaining high in 1945, even should Germany collapse, civilian owners and users of tractors face an extended bout with Old Man Wear and Tear. WPB reports that 85 per cent of the four heaviest types of tractors are still being drafted for military service and that the combined military and civilian needs for track-laying tractors continue larger than the total production capacity of the tractor industry.

Greater improvement in the parts situation would help. It has eased a bit, but 65 per cent of all repair parts must still be shipped to the military services, and complaints are still heard in some civilian quarters that there is a severe lack of repair parts. Those equipped with adequate machine-shop facilities are coming through fairly well. Metallizing and facing with hard-surfacing alloys will be used in greater extent this coming year, to extend the life of shafts and treads in particular.

The use of proper lubricants in the correct amount, careful checking of all wearing parts, proper adjustment of carburetor or fuel injection with just the right timing, and continued instruction of all operators to spare the clutch and brakes, will help you crawl through 1945.

Support the Red Cross

On the Sunday following the liberation of Allied internees in Manila, the *New York Times* carried a story by Ford Wilkins, whom our "constant readers" will remember as a regular contributor to CONTRACTORS AND ENGINEERS MONTHLY some 18 or 20 years ago, and who was *Times* correspondent in Manila when that unfortunate city fell to the Japanese. Mr. Wilkins' story, like all those coming from the liberated Philippines, was both saddening and heartening—saddening as it brought home to us once more the horrors of internment by so brutal and bestial an enemy and heartening on two counts: first, because of the good news that a former member of the C&E family had survived the ordeal, and secondly, because Mr. Wilkins' story told of what American Red Cross supplies had meant, in uplifted morale and even in saving lives, to the internees.

The prisoners-of-war and internees in the Philippines have been liberated, but there are thousands of Americans still in the hands of the enemy. Their only contact with home is through the Red Cross. But that is not the only service rendered by the Red Cross. Others include its work among our fighting forces on every battle front, aid to their families, and on-the-spot assistance at any disaster here at home.

This month, the American Red Cross is raising its 1945 War Fund, entirely through voluntary contributions as all Red Cross activities have always been financed. The most you can possibly give is the very least you can give to the 1945 Red Cross War Fund.

Post-War Program For Flood Control

The potential post-war civil works program of river and harbor, flood-control and multiple-purpose projects by the U. S. Engineer Department totals $4,600,000,000, Major General Eugene Reybold, Chief of Engineers, U.S. Army, told members of the Associated Equipment Distributors at their Twenty-Sixth Annual Meeting in Chicago in January. This program includes projects adopted by Congress in the amount of $3,063,000,000 and economically justified projects recommended in survey or review reports submitted to Congress.

Of the total program authorized by Congress, detailed construction plans and specifications are now ready for a volume of work estimated to cost $500,000,000 and distributed generally throughout the country. Present planning schedules contemplate completion of sufficient plans and specifications to permit the initiation of work on projects totaling $731,000,000 by the late summer of 1945.

However, in speaking of this contemplated program, General Reybold emphasized most forcibly that, before that happier future time when men and machines can be turned again to building peacetime projects, there is a tremendous job to be done in winning the war, which must have all our effort and energies to bring about its speedy and victorious conclusion.

Bridge Models Make Design Study Easier

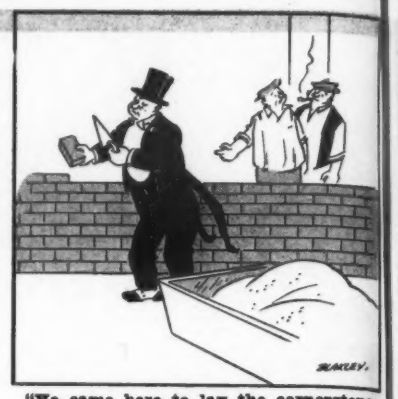
Observation of the action of traffic when crossing a bridge has revealed a need for some change in design to eliminate the illusion of a narrower roadway when a driver enters a bridge. The Ohio Department of Highways has made a study to see how the design of bridge approaches themselves may be changed to accomplish this result.

At the Thirtieth Annual Meeting of the American Association of State Highway Officials, Ohio displayed two models with interchangeable parts so that studies of the effects of different types of hand-rails, end posts, and bridge rails might be made most economically. The first model was made of cardboard with removable bridge rails and rail ends of wood. Since the cardboard model did not permit the flexibility of change desired, a second model was made. This has a framework of wood over which hardware cloth and burlap make a foundation for moulding plaster.

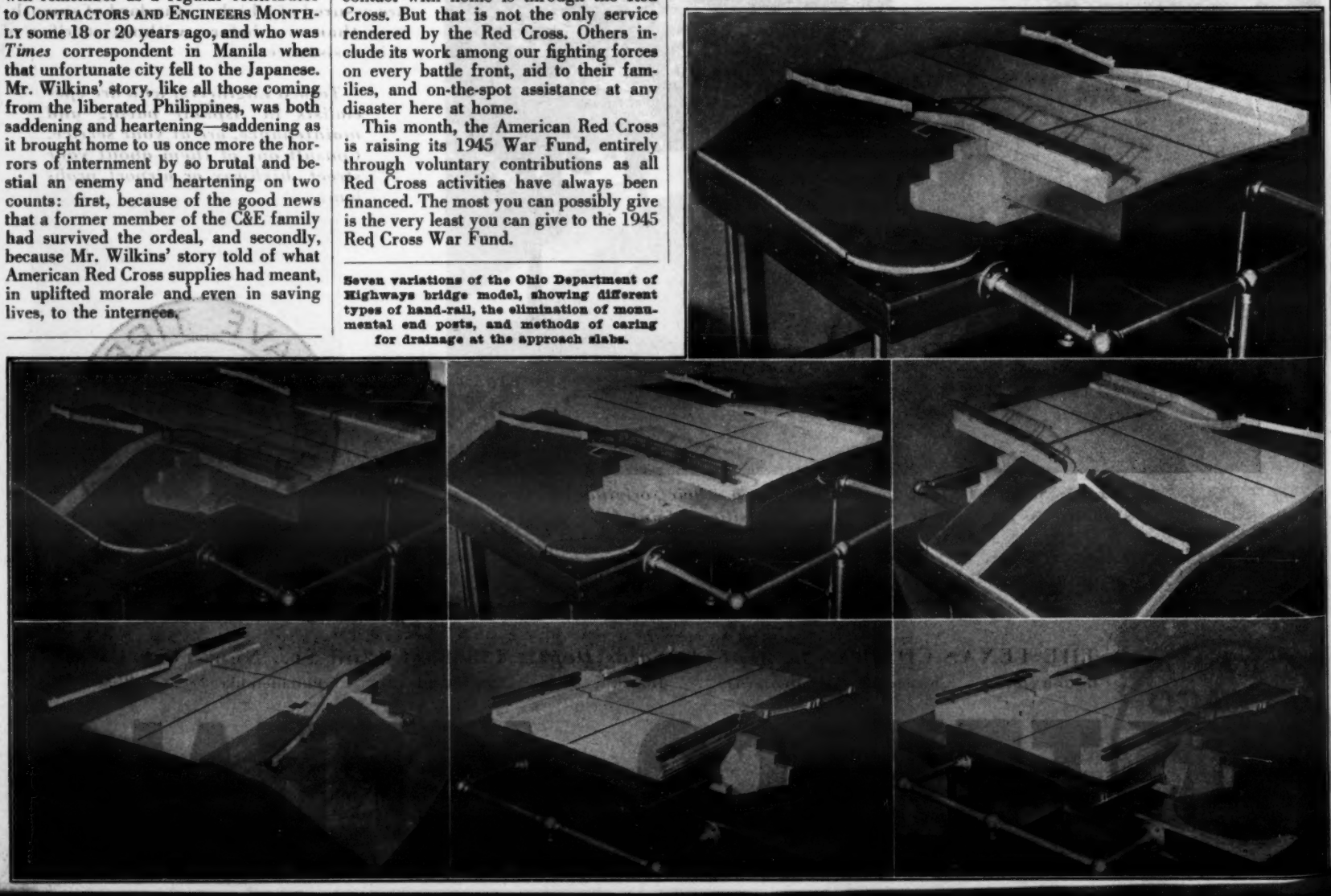
The rails on the second model are demountable, and the approach slab and slopes adjacent thereto are constructed as removable panels. These panels permit changes in drainage and rail-end treatment adjacent to the approach slab.

Studies made with the aid of these models to date have definitely indicated the desirability of eliminating the monumental end posts so common in bridges. Time has not permitted exhausting all of the possibilities of the model in answering design problems.

The models were built by one of the department engineers and it is felt that they have many advantages for study both by non-technical and technical men. This project was under the direction of Murray D. Shaffer, Chief Engineer, Bureau of Location and Design, Ohio Department of Highways.

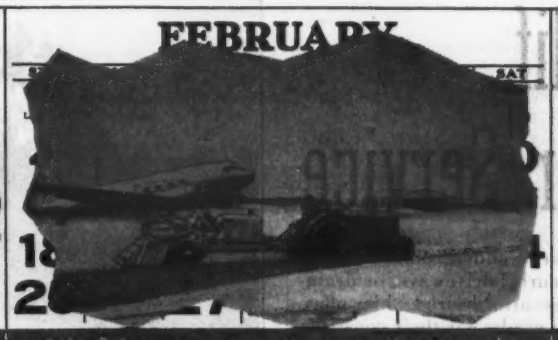


"He came here to lay the cornerstone and the War Manpower Commission won't let him quit."



Seven variations of the Ohio Department of Highways bridge model, showing different types of hand-rail, the elimination of monumental end posts, and methods of caring for drainage at the approach slabs.

Shattering ice on city street. Fragmentation complete and entirely free of pavement.



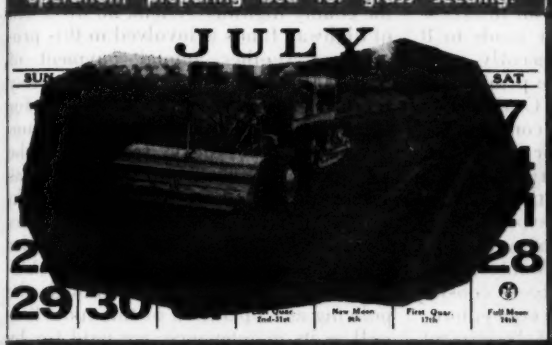
Pulverizing snow prior to compaction to make smooth, high loadbearing, safe snow runways.

Leveling deep ruts on ice covered runway. Ruts caused by taxiing in slush which re-froze.

Clearing highway shoulder of brush and, in same operation, preparing bed for grass seeding.

Use of SEAMAN MIXER in stock pile mixing often cuts costs in half and effects better mix.

Aerating to dry wet aggregate. Same method used in bituminous mix to lower solvent content.



Road mixing in soil-cement highway construction. The SEAMAN gives excellent control of mix.

SEAMAN MIXER in pulverizing soil and mixing water increment in earth work increases density.

Pulverizing old, rough sod to obtain smooth, level condition after re-seeding.

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- ☐ Shoulder stabilization
- ☐ Roadside seed beds and mulching
- ☐ Pulverizing sod
- ☐ Clearing land of brush and roots
- ☐ Pulverization of snow prior to compaction for snow runways
- ☐ Removing ice from streets, highways and runways
- ☐ Seed bed preparation for public nurseries
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We'll be glad to supply complete information about the application checked.

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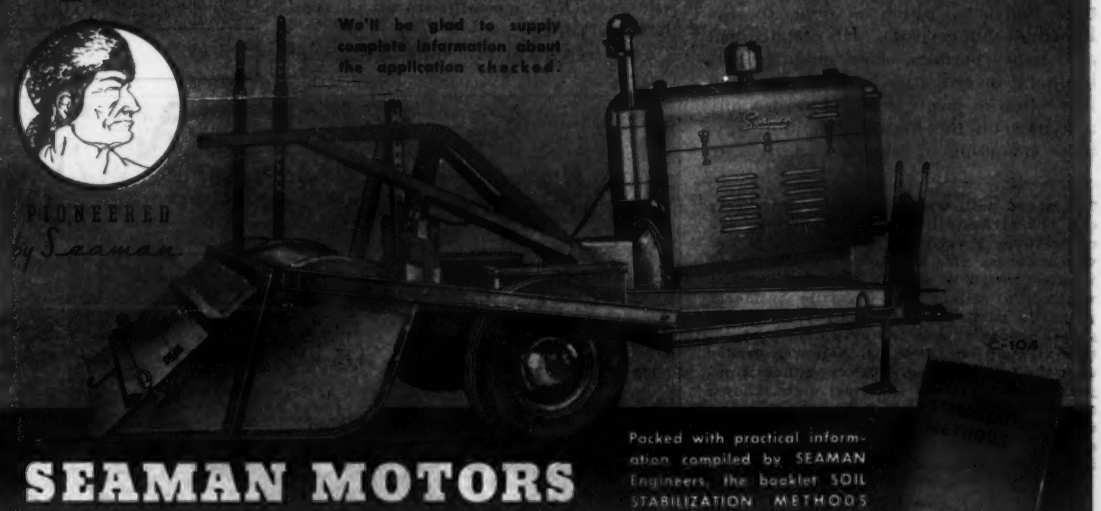

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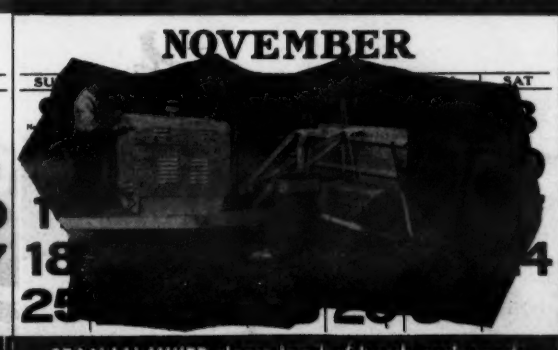
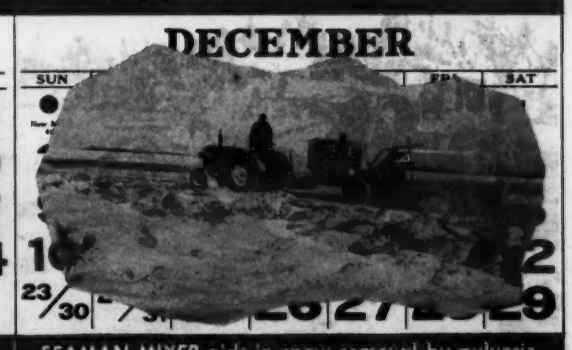
Packed with practical information compiled by SEAMAN Engineers, the booklet SOIL STABILIZATION METHODS will be sent on request. Ask for Bulletin C-24.

SEAMAN MIXER improves effect of mulching to benefit seeding or in preventing soil erosion.



SEAMAN MIXER clears land of brush and weeds and effectively removes tangled root systems.



SEAMAN MIXER aids in snow removal by pulverizing and leveling hard, compacted frozen drifts

Alameda County, Calif., Organized for Service

Unit Organization Under County Surveyor Is Well Financed, Operates Shops, Posey Tube; Post-War Plans

By FRANK B. SARLES,
Western Field Editor

✦ ALAMEDA County on the eastern side of San Francisco Bay with its county seat in Oakland, Calif., is confronted with two unusual problems in addition to the usual highway-department activities. These include the policing and operation of a heavily traveled vehicular tunnel under the estuary between Oakland and Alameda and the necessity for maintaining well defined center stripes, despite wartime shortages of satisfactory paint, because of the heavy fogs which may occur in the county at certain times of the year.

County Organization

Alameda County, with an area of 840 square miles, 80 of which are partially or wholly submerged under San Francisco Bay, and a county road system of 550 miles, is governed by a Board of Supervisors consisting of five men, elected for four-year terms from the five political districts of the county. Unlike most California counties, which ordinarily maintain their roads by districts with the work under the direction of the supervisor, Alameda County has established centralized control of all road construction and maintenance under the direction of the County Surveyor. This office is also filled by election, the term being four years.

The County Surveyor supervises all planning for new construction, prepares plans and specifications, and is responsible for all activities in connection with the road system, except the purchase of materials, supplies, and equipment, which is done by the County Purchasing Agent, and the actual award of construction contracts, which is done by the Board of Supervisors. His department also issues permits, after adequate preliminary investigation and construction inspection to insure compliance, for any activities on the highway right-of-way, from trimming or planting of trees to the installation of underground utilities. If sidewalks, curbs, driveways, or drainage structures are desired, his office establishes the grades for their construction.

The technical forces of the office consist of a Chief Assistant Engineer, twelve technical designers and draftsmen, two complete survey crews, and a five-man accounting department. Maintenance is handled, under the supervision of the County Surveyor, by two maintenance engineers, one of whom takes care of the routine upkeep of roads and the other devotes his time to special problems involving complete reconstruction or unusual features. Three district maintenance superintendents supervise field maintenance in the three maintenance districts into which the county has been divided, looking after the activities of seven crews, each of which is composed of a foreman and from three to eight regular men. Four of these crews perform routine maintenance, such as mowing and surface patching; a fifth, using a large distributor and more equipment, performs heavier patching and sealing operations, approaching construction in magnitude; a sixth crew handles emergency grading anywhere in the county; and the seventh looks after bridge and culvert repairs. This system has proved more economical and satisfactory than that formerly used when eighteen separate maintenance organizations performed all work in eighteen separate districts of the county. Civil-service benefits have reduced the loss of trained personnel suffered in other counties during the war so that over half of the trained organization, including practically all of the more skilled workers, is still with the department.

Storage yards are maintained at Hayward in the western, and at Livermore, in the eastern part of the county, while the central repair shops and heart of the maintenance operations are situated at Niles, which is accessible to all parts of the county.

The comparatively low mileage of county highways is explained by the large area of the county which is included within the limits of the heavily industrialized cities along the Bay shore as well as the fact that the county contains 124 miles of highways which are a part of the state system. Of the 550 miles under county maintenance, approximately 70 per cent have a 1-inch bituminous armor coat on top of a gravel or crushed-stone base, varying in thickness from 5 inches on the older roads to 8 inches on those more recently constructed. The remainder are principally gravel-surfaced roads in the Coast Range mountains which occupy a considerable portion of the county. Prior to the war, an annual program of betterment, which will be resumed when conditions permit, was included in the County expenditures. Additional base thicknesses were provided and, in some cases, County forces applied the armor coat to bases considered adequate. The general policy, however, was to perform most betterment work under construction contracts, awarded on competitive bids, to responsible contractors.

The traffic striper used by Alameda County, Calif., to keep traffic lanes on its county highways clearly marked.

Finances

Wartime income, reduced to about 70 per cent of normal because of gasoline rationing, is about $900,000 annually. This income is derived from the 1 cent per gallon of the state gasoline tax collected in the county and one half of the registration fees for motor vehicles licensed from Alameda County. No assessment against real property is made for highway purposes, although this could be done, if necessary, under existing statutes.

From this income the County uses $160,000 annually to reimburse the State for relief funds advanced in 1933 and 1934. Since the money originally advanced by the State was spent entirely on the county highway system, no diversion of highway funds is involved in this procedure. Another annual payment of $170,000 is made from county highway revenues to retire the bonds issued for the construction of the Broadway Tunnel which carries heavy traffic from the Bay region to suburban residential areas east of the mountains along State Highway 24. Bonds issued for the construction of the Posey Tube, a tunnel under the estuary between Oakland and Alameda, have been retired, although the policing and operation of this tunnel, as well as its maintenance, are paid for by the County and controlled by the County Surveyor's office.

County-Operated Vehicular Tube

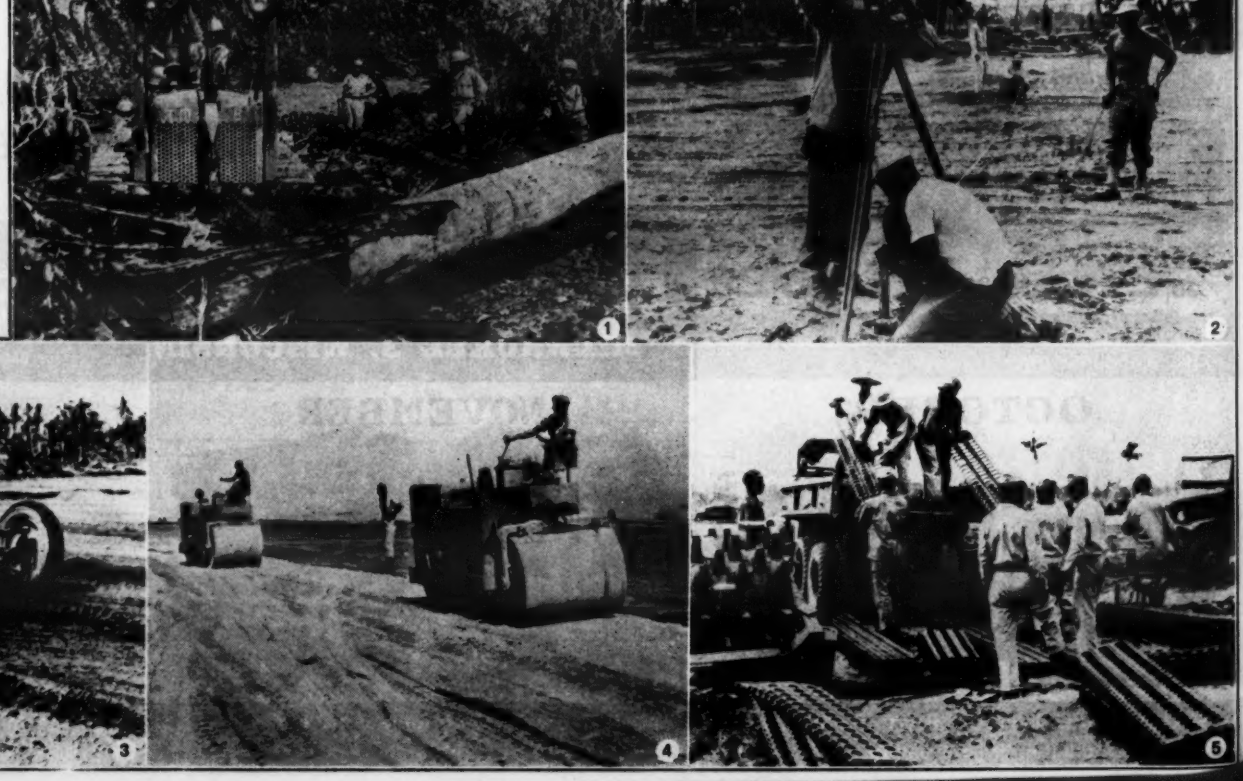
One item of expense not encountered in most counties is the policing, maintenance and operation of two double-leaf bascule bridges over the estuary between Oakland and Alameda and the Posey vehicular tunnel under it. The bridges are a 4-lane structure of 240-foot clear

(*Continued on page* 34)

BUILDING AN AIRSTRIP ON LEYTE

The speed with which our Army Engineers can put airfields into effective service has contributed greatly to our successful advance across the Pacific. 1. Clearing out jungle growth is usually the first step, in which the valiant and versatile bulldozer plays its part. 2. After clearing, U. S. Engineer troops survey the area of a prospective airstrip on Leyte. 3. A power grader does the final leveling. 4. Heavy rollers compact the site before the steel mats, shown at the right, are laid. 5. Unloading the steel mats which provide the surfacing for the airstrip. At left, a sheepsfoot roller which aids in final compaction before the mats are put down.

U.S. Army Photos from British Combine



Portraits in Print

By BILL QUIRK

Fred Lavis, Consulting Engineer, Cautions on Foreign Construction

WHILE Fred Lavis, international authority in civil-engineering consultant circles, sees plenty of opportunities for contractors and engineers in post-war foreign construction, particularly in Latin America, he suggests that enthusiasm in that direction be tempered with a little caution. The 74-year-old New York consulting engineer, who for the past six years has been Transportation Advisor to the Minister of Public Works of the government of Venezuela, feels that United States contractors should realize that business south of the border is carried on in a different manner, and at a slower tempo, than is customary in this country.

The awarding of contracts, for instance, is not done in the brisk fashion or with the positiveness that has become associated with United States construction progress. In a recent interview at the Union League Club in New York City, Mr. Lavis cited two examples of South American business practices that were sufficiently unorthodox, as compared to our customs, to make U. S. contractors old before their time.

"Last year the City of Caracas in Venezuela," Mr. Lavis reported in his characteristic forthright style, "requested bids for a new water-supply system which was to cost around $15,000,000. These bids were to be received for opening on February 1, and many prominent contractors in the United States sent representatives down to bid. Suddenly. for no apparent reason, the opening of the bids was postponed a month, so everyone had to sit around until March 1 to see who was to get the contract. In the meantime, the expenses of these contractors' men were piling up at the rate of $15 a day, not counting drinks."

Here Mr. Lavis shuddered at the thought of such economic waste, and he burped slightly at mention of the drinks. Throughout his career, economics in engineering has been his forte, and the contemplation of construction men sitting around doing nothing was highly distasteful.

"They finally opened the bids," he continued, "then awarded the contract, not to the lowest bidder but to someone in the middle, who thereupon proceeded to get his bid amended. Up here we would consider such a procedure somewhat irregular.

"A similar instance occurred recently in Bolivia on a big highway contract when U. S. contractors must have spent at least $25,000 to send men down to bid on the work. After looking over the proposed job, the contractors decided that the engineers' estimate was way out of proportion, and consequently submitted much higher bids, with the result that the contract was not awarded. The contractors simply threw away a lot of money without getting anywhere.

"Fortunately, however," added Mr. Lavis, "not all jobs are like that. Contractors such as the Raymond Concrete Pile Co., the Frederick Snare Corp., and R. W. Hebard have been doing fine work in Latin America for many years and also making money. Engineering firms such as Parsons, Brinckerhoff, Hogan & Macdonald of New York have gone to Venezuela and bid successfully on such work as the design of reinforced-concrete bridges which will be constructed there. And that is true of other contractors and engineers. But you have to watch your step. I do not look for any great splurge of construction in Latin America right after the war. I think there will be more doing here at home since we at least shall have the money to spend."

As Fred Lavis talked, he relaxed in the spacious lounge of the Union League Club of which he is a member. He is a big man, 6 feet 1 inch, and well over 200 pounds, with a booming, rasping voice and a hearty laugh that comes quickly and often. Now and then he would glance through the large windows, extending to the floor, at the late morning traffic around Park Avenue and 37th Street. Beneath shaggy eyebrows, the color of wood ash, blue eyes look out intently through metal-rimmed glasses. His iron-gray hair, of which there is still a goodly amount, is combed neatly. Heavy jowls sag a little but his figure is erect.

Everything about the man connotes bigness—his hands, ears, bulbous nose, his hearty manner, and his great disdain for what might seem to be accepted opinions in most circles. "I'm a so-called rugged individualist," he described himself with an engaging, unboastful grin, and the expression in this case is no cliché but an apt word picture.

Blank & Stoller
Fred Lavis, internationally known consulting engineer.

Immigrant Boy

Fred Lavis was a rugged individualist from the beginning of his life, as was

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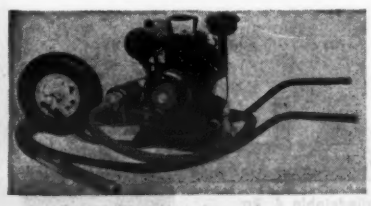

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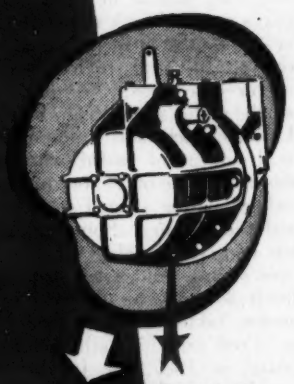

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ISAACSON

SEATTLE

Grading for a new railway in Venezuela, in 1940.

Story of Fred Lavis, Consulting Engineer

(*Continued from preceding page*)

his father John, a sailor in the British Merchant Marine. The family lived at Torquay, Devonshire, in southwestern England on the channel coast east of Plymouth, where Fred was born on January 8, 1871. The urge to travel, inherent in both father and son, stemmed no doubt from their remote Huguenot ancestors who left France for England before the revocation of the Edict of Nantes in 1598.

Young Fred received a sound but not a very long period of education at St. Lukes, a small church school with about forty boys, located in his home town of Torquay. Although to his recollection he never rose above the middle of the class, the sailor's son was well instructed in Latin, French, and mathematics. His formal education ended when he left school at the age of 14, but his informal or self-education started soon after and is still continuing. Some poor investments had cost the elder Lavis his hard-earned savings and, when work became difficult to find, he decided to go to America, taking his son, then 16, with him. Fred and his father sailed from England in 1887, the Jubilee year of Queen Victoria, bound for Boston where Lavis had some distant cousins.

John Lavis, the sailor, did not find work to suit him in America, became restless and returned to England, but young Fred decided to stay here. He was now working as an errand boy earning $3 a week, on which he managed to live with an additional $2 he received from his relatives.

"There I was," he reflected, "squarely on my own in the land of the bean and the cod. I enrolled for night courses in the Boston public schools and studied anything to which I took a fancy. One day I saw an advertisement in the male-help-wanted columns of the Boston *Herald* for a tutor in algebra. I applied and got the job, which was the instruction of a boy about my own age who wanted to enter the Massachusetts Institute of Technology. Algebra was still fresh in my mind, so I taught all I knew about the subject to my pupil who successfully passed his entrance exam.

Engineering Start

"I continued reading the help-wanted columns of the Boston *Herald*, and one day saw a notice that a surveyor wanted a rodman. Hell and damnation," Mr. Lavis' laugh rang around the room, "I didn't know what either a surveyor or a rodman was. The surveyor, who turned out to be a scholarly Bostonian, stated in his notice that applicants for the job must work out and send in a solution to the Pythagorean proposition. I had acquired a smattering of geometry by this time, so that I knew how to develop and illustrate the theorem that in a right-angled triangle the square of the hypotenuse equals the sum of the squares of the other two sides. I sent in the solution and, much to my surprise, got the job of rodman. That was how I became involved in the engineering profession and I have been in it ever since.

"My pay was 12½ cents an hour when we worked," Mr. Lavis reminisced, "but the first day it rained continually so we could not go out to survey anything. I reduced some notes in the office which took a half hour and collected 6¼ cents for my day's work. After I learned what a rodman was all about, I got a job with the Boston & Maine Railroad on wharf construction along the Mystic River in Boston.

"When I was 19, I went to Cuba with a survey party on railroad location. The project was on the south coast of the island in the neighborhood of Santiago de Cuba where the promoter of this venture expected to find an iron mine for which he intended to develop docks and railroads. Shortly after we arrived, the

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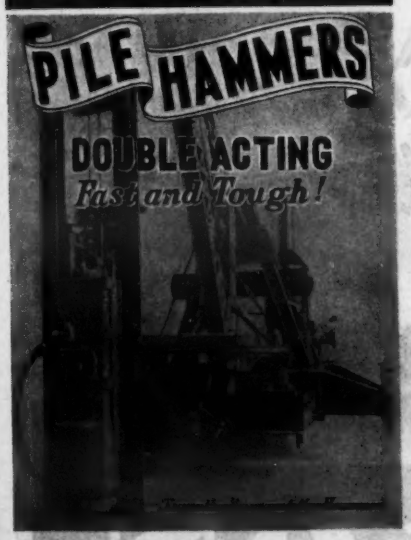
UNION



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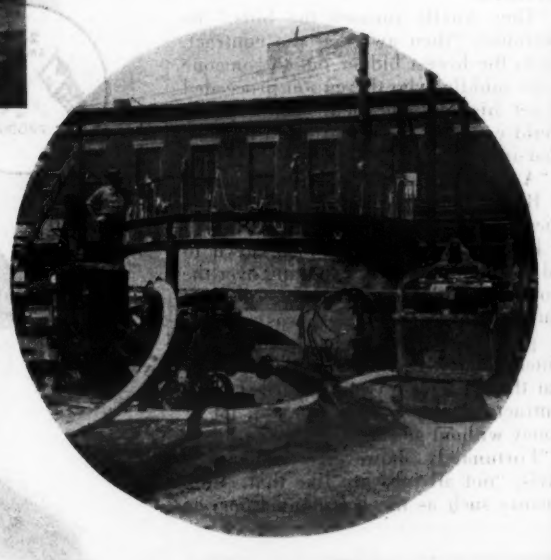

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Story of Fred Lavis, Consulting Engineer

(*Continued from preceding page*)

transitman came down with fever and I was given his note book and told to run the instrument. I saw that he kept his notes running from the bottom to the top of the page, but did not know that that was the accepted practice. That night I went to the Chief Engineer and asked him why notes were kept that way instead of from top to bottom. He just looked at me, probably stumped himself, pointed his finger at me and yelled, 'Get the hell out of here. Any goddam fool ought to know that.' So that was the way I was educated," chuckled Mr. Lavis.

Linguistic Studies

The Cuba mine never materialized, so young Lavis, who was learning his engineering the hard but practical way, left the island in 1892 for Colombia, South America, on more railroad construction. During this period between the ages of 19 and 22 Lavis acquired facility in the Spanish tongue in which he is still an expert linguist, and today often addresses, in excellent Spanish, luncheons of the Pan American Society of which he is a member of the Council. His friends, knowing his gay nature, have often accused him of attaining proficiency in the Castilian tongue by using a "sleeping dictionary" during the romantic years of railroad engineering in those torrid Latin lands. Lavis is quick to deny this, however, and gives credit to an old padre of Colombia with whom he used to talk in the evenings after his day's work was done.

"I was impatient in those days," Lavis reflected, "and used to tell my troubles to this old patriarch—how material didn't arrive on time, or how things were going wrong on the job, and how hard it was always to say the right thing in this strange language. He would chide me gently saying, 'Tengas paciencia hijo mío, con paciencia ganarás el cielo', which is 'Have patience, my son, with patience you will gain heaven.'

"I have been trying ever since to gain patience and with the help of God I think I have acquired some by this time," said Mr. Lavis with feeling.

"But to get back to this subject of language, I think I experienced ideal conditions for learning a foreign tongue. I was young and living in a country where everyone spoke Spanish, so I could not help but speak it also. Whenever I speak the language now I unconsciously use my hands to express myself as does nearly every native of Latin America.

"I was in Italy during the last war on behalf of the American International Corp. and formed a construction company of which Guglielmo Marconi was President and I was Vice President. We expected to do big things in Italy along the line of public works development but nothing much came out of it. I did learn Italian readily enough but it did not stay with me, at 47, the way Spanish did when I was 21.

"Schools are now doing a splendid job in teaching languages. The only way you will learn colloquialisms, however, is by talking with the natives of a country. I got a laugh the other day when General A. C. McAuliffe answered a German ultimatum to surrender with the word 'nuts'. A bewildered French newspaper credited McAuliffe with saying to the Germans 'you are like old nuts'."

Back to the States

Fred Lavis returned to this country to work on the surveys of a grandiose scheme of Austin Corbin, owner of the New York & New England Railway and predecessor of those great railroad magnates, Gould and Harriman. Corbin envisioned a line to connect with the Housatonic Railroad, which ended at South Norwalk, Conn., and which would parallel the New York, New Haven & Hartford line into New York, but would tunnel under the East River where the Whitestone Bridge is now located. This railroad would then continue on from College Point to Long Island City at the west end of Queens. If this plan had been projected, the Hell Gate steel arch railroad bridge, completed over the East River in 1917, might not have been built.

A group of Boston engineers in 1889; Mr. Lavis is second from the right.

"On that job I met a man by the name of Jacobs," Mr. Lavis resumed, "who later became Chief Engineer of the tunnels for the Hudson & Manhattan Railroad, and the Pennsylvania Railroad under the Hudson River. Jacobs was an eminent English engineer, an expert on subaqueous tunnels, who came out to look at our work on the railroad survey in top hat, spats, and cane. We tough

(*Continued on page 65*)

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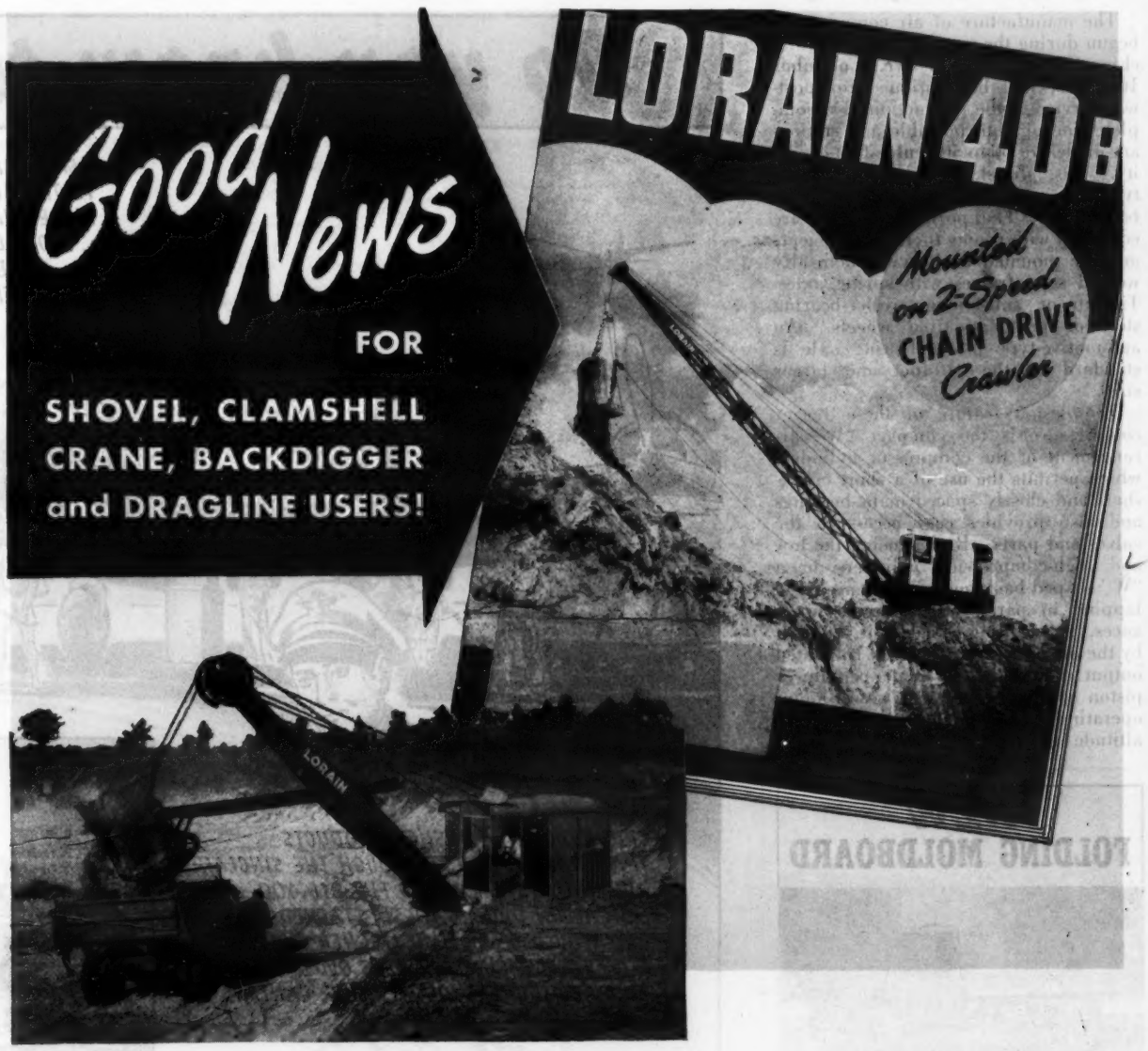

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One of the new Jaeger air compressors.

Line of Compressors Announced by Jaeger

The manufacture of air compressors, begun during the war by the Jaeger Machine Co., 701 Dublin Ave., Columbus 16, Ohio, will be continued for post-war service in the production of a complete line of both portable and stationary models of 60 to 500-cubic-foot capacity. Gas, diesel, or electric-powered types are available with either direct or belt drive. The portable models are equipped with roomy tool compartments and are mounted on heavy structurally welded steel frames with spring axles, Timken or anti-friction roller-bearing steel or pneumatic-tired wheels. An automotive-type pivot steering axle is standard on the 210-foot and larger sizes.

The design feature of these Jaeger compressors is the compact "W" arrangement of the compressor cylinders which permits the use of a short crankshaft and closely spaced main bearings and also provides easy access to the valves and parts. By balancing the low and high-compression cylinders in a "W" shaped bank and micro-honing and lapping in parts to automotive tolerances, the resulting efficiency is reported by the manufacturer to permit full rated output of air with 20 to 30 per cent lower piston speed and with the power plant operating well below its capacity at any altitude in the United States.

Advances in air cooling, also derived from war experience, have simplified the control of the heat and condensation which result when air is compressed. Air-animated valves of unusual size and high lift provide free air flow without back pressure. By this valve action, in combination with improved cylinder radiation and more efficient intercooling, it is stated that air compressed to 100 pounds per square inch is held to a temperature within 100 degrees of the surrounding atmosphere, eliminating both the danger of over-heated tools and the pressure losses caused by sharp drops in temperature in long air lines. Condensation and oil vapor are controlled by automatically unloading and draining the corrosive fluid from the intercooler system during each idling period.

Valves and pistons are interchangeable throughout. To meet the rigorous requirements of field service, all units have full force-feed lubrication, the bearings and Twin Disc multiplate clutches are designed for lifetime service, and grouped control panels, unusually large air receivers, sectional radiator grills, extended lubrication fittings, and protected fuel tanks are standard features.

Further information on this new line of Jaeger compressors may be secured direct from the manufacturer by referring to this illustrated item.

New Mack Dept. Mgr.

The appointment of John H. Middlekamp, recently resigned Director of the Automotive Division of the War Production Board, as Manager of the Government Department of Mack Trucks, Inc., has been announced. Prior to his service with the WPB, Mr. Middlekamp was a Lieutenant Colonel in the Army, handling truck production problems.

Mr. Middlekamp, who will continue as a consultant to WPB and will retain his chairmanship of the Truck Committee of the Combined Production Resources Board, will make his headquarters in Mack's executive offices in the Empire State Building, New York City.

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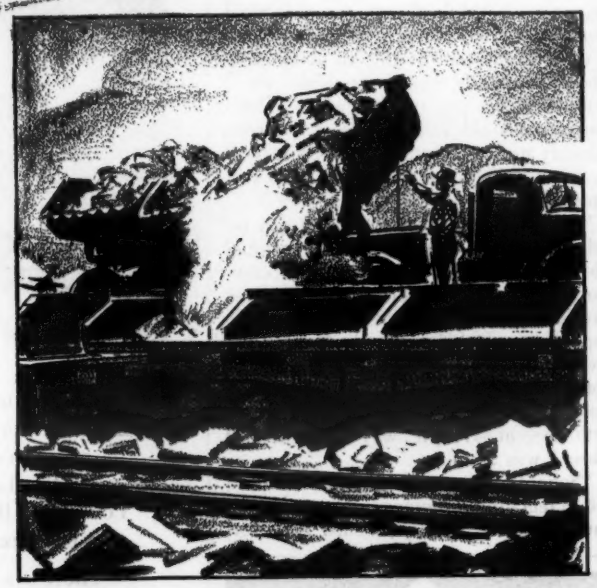

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Concrete Resurfaces Old Concrete Road

L. G. Arnold, Inc., Placed 5.2 Miles of New Concrete On 20-Year-Old Section of U. S. 14 in Illinois

✦ TIME was when the construction of a new 22-foot concrete pavement 5 miles long was considered nothing strange or unusual, but rather just an average event in the business of road building as practiced throughout the U. S. A. In 1944, however, such a sight was all too rare. One such project, on U. S. 14 south of Harvard in McHenry County in northern Illinois, was necessitated by the fact that the 20-year-old 9-6-9-inch concrete pavement, already beyond the repair stage, could not have its face lifted any further by patching, resurfacing, or surface treatments, but had to be replaced. The contract for this work was awarded to L. G. Arnold, Inc., of Eau Claire, Wis.

The Illinois Division of Highways decided to use the old road as a foundation for a new 10-inch uniform concrete slab and raise the grade generally throughout its length of 5.2 miles, except in a few sections where the new profile, designed for smoother grades, called for a cut. In such instances the old pavement was broken up by a 1,000-pound pile-driver hammer, mounted in leads on a truck and hoisted by a power take-off from the truck engine. The concrete rubble was then shoveled into trucks and hauled away for use in the fill sections.

Excavation and Borrow

Grading consisted of both roadway and borrow excavation. The latter was obtained from two pits, one located ½ mile from the south end of the job and the other ½ mile from the north end. The material was handled by 12-yard scrapers and a 1½-yard shovel. Nine inches of topsoil was removed from the borrow pits, stockpiled, and later, when the borrow excavation was completed, replaced to permit ground cover to grow and hide the pit.

Where old pavement was removed, a minimum 6-inch layer of granular borrow material was put down. This was sometimes increased to 2 feet when bad soil conditions were encountered in excavating. Where the old pavement was left in place under the new slab, a minimum 3-inch, but usually as much as 6-inch, layer of granular borrow was placed. For less than a 6-inch layer, the material was graded to all pass a 1½-inch sieve and not less than 33 nor more than 65 per cent to pass a No. 4 sieve. Where 6 inches or more of granular borrow was placed, larger-sized stone was permitted in the borrow layer so that all material passed a 3-inch sieve, while not less than 33 nor more than 65 per cent passed a No. 4 sieve as before. Material containing not more than 10 per cent clay and silt was required.

Granular borrow, which was loaded by draglines, was hauled in 10-yard International trucks, dumped, and then spread by a Caterpillar RD4 tractor with bulldozer and an International TD-14 tractor with bulldozer. This foundation material was placed in not more than 6-inch layers for a width of 24 feet or 12 inches beyond the edge of the new pavement on each side. As an aid to compaction, the earth fills and the granular borrow were kept wet by a 1,000-gallon water tank with a 10-foot spray bar mounted on an International truck. Each layer of earth fill was thoroughly disked and then compacted by a sheepsfoot roller pulled by an International T-20 tractor. A rubber-tire roller pulled by an International rubber-tired tractor was used to compact the granular borrow. Final shaping of the gravel foundation was done by an Adams and a Caterpillar power grader.

Batching Plant

The batching plant for the paving was set up just outside the town of Harvard about a mile from the north end of the job on a siding of the Chicago & North Western Railway. Sand and gravel were purchased from the Consumers Sand & Gravel Co. in South Beloit, Ill., and shipped the 30-mile distance in railroad cars, then unloaded and stockpiled by a Koehring 503 crane with a 1¼-yard

(Continued on next page)

C. & E. M. Photo

A Buckeye B-B Finegrader cuts the final grade which was then compacted by a Fordson 5-ton roller, on the L. G. Arnold concrete paving contract on U. S. 14 near Harvard, Illinois.

● As there are no steering clutches to "fight" nor individual brakes to "humor" or grab, the true directional steering of a Wooldridge Terra-Cobra eliminates any chance for *"Jacknifing"* to occur with resultant costly accidents, damage and down-time. Power is maintained on both wheels simultaneously. The front drive wheels both turn under power with their respective speeds automatically governed by differential gears in exactly the same manner as heavy duty trucks. Operators are able to maintain higher hourly yardage averages as fatigue is reduced to a minimum. Get the full facts today.

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SUNNYVALE, CALIFORNIA

WOOLDRIDGE TERRA COBRA
SELF-PROPELLED EARTHMOVERS

SAND'S Aluminum Line & Surface LEVEL

Endorsed and Adopted by Road Builders and Contractors

Level is easily and quickly attached to line. Special feature construction prevents accidental detachment from line. Construction is sturdy, and accuracy guaranteed.

SAND'S LEVEL & TOOL CO.
8531 Gratiot Ave. Detroit 13, Mich.

Concrete Resurfaces Old Concrete Road

(*Continued from preceding page*)

clamshell bucket. Two Butler batching plants each of 35-cubic-yard capacity delivered the sand and gravel to the two-batch trucks. The bins were connected by an elevated runway so that one operator could batch at both plants.

Bulk cement was bought from the Alpha Cement Co. plant at LaSalle, Ill., and shipped in freight cars via Chicago, covering a distance of about 150 miles on its way to Harvard. The cement was unloaded from the hopper-bottom cars into a pit whence a revolving screw carried it to a bucket elevator which raised it to a Butler cement bin of 350-barrel capacity. A double spout below double hoppers on this bin permitted loading the cement for two batches into a truck simultaneously. The trucks were loaded with the gravel first, moved to the cement hoppers, and then back to the sand bin for the balance of the batch. Sixteen trucks, ten of which were owned by the contractor and the rest rented, of various makes and sizes but all capable of holding two batches, were used in hauling the dry batches to the paver.

The weight of a batch, allowing for moisture, was as follows:

Sand	1,721 pounds
Gravel	2,979 pounds
Cement	716 pounds
Total	5,416 pounds

To this dry batch, 34 gallons of water was added at the paver.

The screen sizes of the gravel used as coarse aggregate were:

Passing	Per Cent
2-inch sieve	100
1½-inch sieve	70-95
1-inch sieve	50-80
½-inch sieve	10-30
No. 4 sieve	0-5

The screen sizes of the sand used in the concrete were:

Passing	Per Cent
⅜-inch sieve	100
No. 4 sieve	95-100
No. 8 sieve	70-90
No. 16 sieve	45-75
No. 50 sieve	5-20
No. 100 sieve	0-5

Preparing the Grade

About 800 to 900 feet of steel road forms were usually set ahead of the paver. A Lakewood form tamper was then run over them, packing the earth beneath the base of the forms in order to secure a firm foundation to prevent displacement when the heavy equipment moved over the forms. A Buckeye R-B Finegrader running on the forms cut the fine grade, discharging the excess material on each side. The subgrade was then rolled by a Fordson 5-ton 3-wheel roller, after which a scratch template resting on the forms was pulled over the rolled surface as a final check to insure a slab of uniform 10-inch thickness. Two men with shovels followed and made any necessary adjustments.

With the fine grading completed, the longitudinal center joint was set to form a plane of separation between the two 11-foot lanes of pavement which were poured simultaneously. This metal joint was supported by steel channel pins.

C. & E. M. Photo
The Twin-Door bucket of L. G. Arnold's 34-E Koehring paver delivers a batch of concrete to the subgrade ahead of the double-screed Jaeger finisher.

Transverse ⅝-inch round deformed steel tie bars, 2 feet 6 inches long spaced 30 inches on centers, were placed through the center joint at right angles to the center line of the pavement. The ends of these rods were in turn supported by steel channel pins which were driven into the subgrade.

A ¾-inch asphalt-impregnated-felt expansion joint was set every 120 feet. Each joint has ¾-inch smooth dowels, 2 feet long, set 5 inches above the bottom of the slab and spaced 2 feet 4 inches across the pavement. Thus each half of the pavement has five dowels, the first one being 14 inches from the center line and the last one 6 inches from the edge of the pavement. Half the length of the dowels was greased and capped to permit longitudinal expansion and contraction as well as load transfer between the concrete slabs. The joints were supported by a special installation plate which was removed after the concrete was placed, while the dowel bars were supported by a special wire basket which remained in place. The expansion joint was set ½ inch low and the slot thus formed was cleaned and filled with hot asphalt, before the road was opened.

(*Continued on page 76*)

Front End Shovels
For Industrial Tractors
Write for Descriptive Circular
White Mfg. Co.
ELKHART INDIANA

—ON HIGHWAY MAINTENANCE

MEET the Athey Force-Feed Loader—the machine that's taking the spotlight on urgent wartime highway maintenance. With manpower shortages seriously hampering highway maintenance, it's little wonder that this time-saving, high production loading tool has been so quickly accepted. Owned by the Highway Department, Multnomah County, Oregon, the Force-Feed Loader shown above is working on an old oil mix road.

The surfacing material is windrowed with a Motor Grader and is quickly loaded into trucks with this versatile loader.

The salvaged oil mix material is then used in the construction of the sub-grade for a vital highway leading to the Portland Airport.

Compare its speedy loading with other loading methods!

Average loading time on this job for each 2-½ yard truck was 43 seconds. Because of the Athey Force-Feed Loader, manpower, materials and taxpayer's dollars are conserved during a time when utmost conservation is essential.

For further information on Athey Force-Feed Loaders, write to your Athey-"Caterpillar" Dealer, or direct to the Athey Truss Wheel Co., 5631 West 65th Street, Chicago 38, Illinois.

Cleaning ditches and loading windrows of excess earth in Contra Costa County, California with Athey Force-Feed Loader and "Caterpillar" Motor Grader.

athey

FORCE-FEED LOADERS

New Sales Manager For Texaco Asphalt

The appointment of A. D. Stivers as Manager of its Asphalt Sales Department, effective February 1, 1945, has been announced by The Texas Co., 135 East 42nd St., New York 17, N. Y. Mr. Stivers, who has been associated with the marketing of Texaco asphalt products in the road-building and other fields for the past twenty-six years, succeeds Frank V. Widger, who has retired.

From 1919 to 1939, Mr. Stivers operated in the southwest, first as Representative and later as District Manager. Transferred to New York in 1939, as Assistant Manager of the Asphalt Sales Department, he held that post until recently appointed its Manager. Sales of Texaco asphalt throughout the United States now come under his supervision.

Line of Hose Accessories For All Types of Service

A 44-page illustrated and indexed catalog, No. 644, has recently been issued by Hose Accessories Co., Lehigh Ave. & 17th St., Philadelphia 32, Pa., listing the Le-Hi complete line of high and low-pressure hose couplings for air, water, steam, paint spray, and welding hose, in malleable iron and steel as well as brass and bronze.

In addition, this catalog contains a special section which deals with the selection of the correct hose coupling for various types of operating equipment. Service selection data have been incorporated to include the proper types of hose couplings for general industrial use, pneumatic tools, pile-driving equipment, discharge, water, suction hose, and various other low and high-pressure applications.

Copies of this Le-Hi Catalog 644 may be secured by readers of CONTRACTORS AND ENGINEERS MONTHLY by writing direct to the manufacturer.

Truck Production Cut

Motor-truck production for civilian purposes has been cut back by the War Production Board, because of manpower shortages, tire scarcities, and increased military demands for trucks. The revised program calls for 120,278 commercial trucks of all types in the first six months of 1945, compared with 133,410 previously scheduled. WPB officials say that the reduced rate will continue in the second half of the year.

ZONE YOUR EQUIPMENT FOR LOWEST COSTS ON EARTH

ZONE 1 "Caterpillar" Diesel track-type Tractors, with bulldozers and rippers

ZONE 2 "Caterpillar" Diesel track-type Tractors, for loading and pulling scrapers

ZONE 3 "Caterpillar" Diesel wheel-type Tractors, for high-speed hauls

MOST big contracts today call for a variety of equipment. A bulldozer, for instance, is your number one work tool. But you wouldn't attempt to do the whole job with bulldozers.

TAKE tractor-scrapers, too. In bidding on a big job, there are many factors to be weighed. How long will the hauls be? What kinds of material have to be handled? What is the total yardage? Are there stiff grades? What shape are the haul roads in? And how fast must the job be done to avoid penalties?

TRACKS? RUBBER? OR BOTH? All the way from chunking out the right-of-way to finishing the grade, track-type tractors are indispensable on a large part of any earthmoving job. And there is a definite place for rubber tires, as well. That is on longer hauls, over good haul roads. To get the job done efficiently, on time, and at lowest cost per yard, you need *both* track-type and wheel tractors.

"CATERPILLAR" JOB ANALYSIS. Your "Caterpillar" dealer knows earthmoving costs and how they vary on different kinds of jobs, and he knows machines. Because he sells both kinds of "Caterpillar" Diesel Tractors — tracks and rubber — his judgment of your problem is fair and unbiased.

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Ohio City Prepares To Build New Airport

Cincinnati Has Surveyed All Available Sites and Will Construct on New Site, Aided by Federal Funds

✦ INSTEAD of merely talking about the post-war construction of a new airport to replace the present Lunken Field, which is not infrequently fog and smoke-bound and is subject to flooding, Cincinnati, Ohio, has been busy for several years doing something about it. The Regional Planning Commission completed an exhaustive study of potential major airport sites in Hamilton and adjacent counties in 1943, and presented a practical report in September of that year. The sites reported on include all those recommended by civic organizations in the area and, since the filing of the report, all have been studied from every angle by City Manager W. R. Kellogg.

The most interesting feature of the report from the standpoint of contractors is its analysis of each site from the construction angle as well as from the final service viewpoint. We record abstracts of the reports on each site that our readers may stimulate similar action in their communities through regional planning organizations and service clubs, to be ready for the anticipated Federal funds sought through the recent CAA report to Congress. These funds would be matched 50-50 by local communities in the same manner in which Federal Aid has worked so effectively to improve our state and interstate highway systems.

Accessibility

Because time is such an important element in aviation, particularly for rather short trips, convenience and speed in reaching an airport are important considerations. Unfortunately, the only large areas which are suitable for airport sites in or near Hamilton County lie at air-line distances of from 11.3 to 17.6 miles from the central business district of Cincinnati. Highway distances are proportionately greater. Access to an airport need not be limited to highways, however, as already one air line has stated that it would use helicopters to carry mail and passengers from town and city roof tops to major air-line terminals.

There is some difference of opinion among aviation officials as to the importance of having a railroad adjacent or close to an airport site. It would be a convenience in connection with construction work on the port itself. Some interchange of both passengers and express or freight cargoes is conceivable. Another possible advantage might lie in the use of the railroad right-of-way to provide on each side of the track a rapid-transit line with light-weight small cars of an entirely new type run inexpensively by pick-up electric power.

Another factor relating to accessibility of site is brought out in the report. Of the population of Hamilton County, which is 454,413 persons as of the 1940 census, 73 per cent lived in the area east of lower Mill Creek, and including Wyoming, Woodlawn, and Glendale. It has been estimated that a high percentage of persons taking passage on air lines start from their homes, rather than from downtown. Thus the relation of residential-population distribution to a proposed air terminal is important and will tend to become increasingly so. It happens that four of the largest airport sites in Hamilton County and vicinity lie east and northeast of the urban centers, and thus would be in the most satisfactory relation both to the center of the city and to the preponderance of population.

Convenient relationships between an airport and industrial areas are fully as important as between an airport and residential districts. We can expect a great increase in the use of air transport for perishable articles, such as sea foods, fruits, vegetables, and flowers, or items of high value but relatively low in weight and bulk, such as precision parts for watches and machines, or the finished products themselves, chemicals, medicines, films, and women's clothes. These are products and materials which go to and from the airport by truck, or possibly by air taxi between airport and plant or distributing warehouses.

Harrison Site

The Harrison site is in Hamilton County, 16.5 to 18.9 air miles northwest of the center of Cincinnati. It has an area of 2,250 acres or 3.5 square miles and is in a valley surrounded by hills, but not obstructed. Dual runways extensible to 10,000 feet in two directions and to 8,000 and 9,000 feet in the other two directions would be possible. A knoll at the west end of the site is too large to be removed. Only moderate grading is required in a soil composed of loam, sandy loam, and silt loam. There are no surface or subdrainage problems, as the entire site lies on a deep gravel fill within a pre-glacial valley of the Ohio River. Ground water is at 30 to 100-foot depth. This site would require 19.4 miles of driving from the center of Cincinnati, and would necessitate the relocation of 3.3 miles of U. S. 52.

Mount Healthy Site

This site is in Hamilton County, 9.5 to 11.8 air miles northwest of the center of Cincinnati, and contains 2,000 acres or 3.1 square miles. It would accommodate four pairs of runways extensible to at least 7,500 feet in length and two pairs which could be extended to 10,000 feet. The soil is a silt loam with poor natural drainage. The site, which cannot be enlarged because of topography, is located 11.3 miles over the road from the center of Cincinnati. An airport is already in existence at Mount Healthy, comprising some 70 acres in the northwest portion of the proposed site. Should

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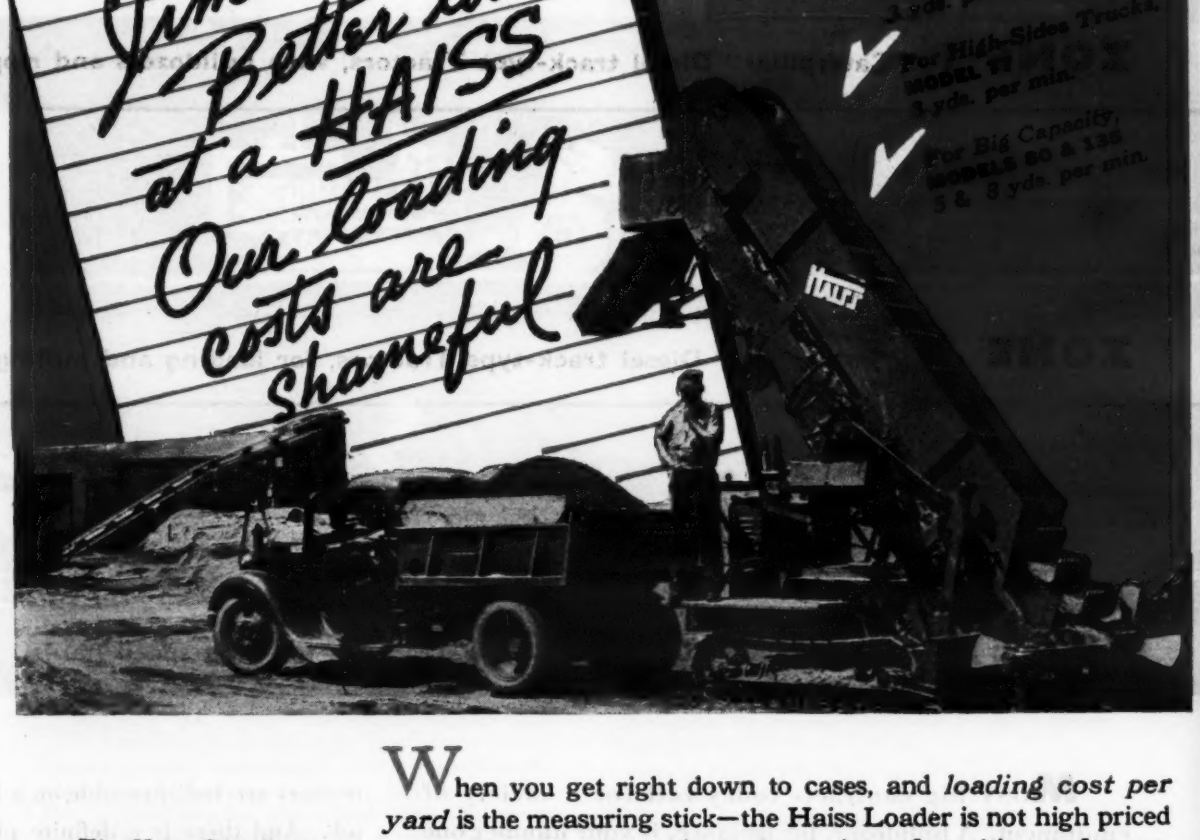
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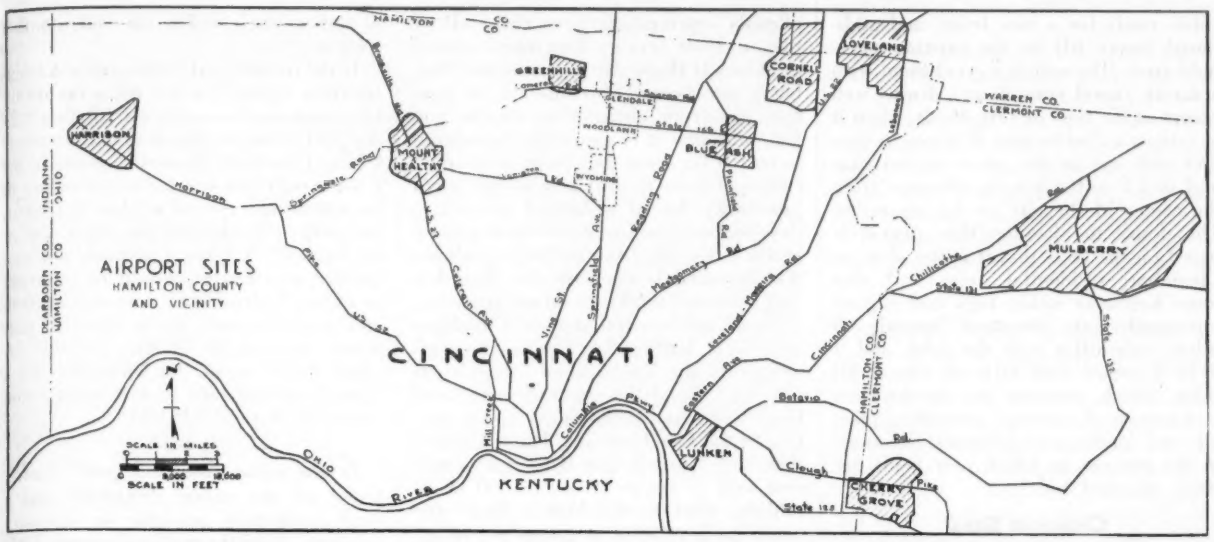

Cincinnati Prepares To Build New Airport

(Continued from preceding page)

this area be developed, it would require relocation of 3 miles of U. S. 27 and 1½ miles of Springdale Road, an important county highway. Very heavy grading would be required for this airport.

Greenhills Site

This location is also in Hamilton County, has an area of 800 acres or 1.3 square miles, is 10 air miles north of the center of Cincinnati, and does not permit extension of runways. Construction would involve heavy grading in a well drained silt loam and some silty clay loam in the northwest corner. Greenhills is 13.8 miles over the road from the center of Cincinnati. The Federal Public Housing Authority's Greenhills housing project occupies 3.5 per cent of this particular tract. All of the area is now leased to small farm tenants. Use of this site as an airport would require the relocation of 1.6 miles of Cameron Road and the realignment of another road which also should be widened throughout its lepgth.

Blue Ash Site

This site is in Hamilton County, 11.2 to 13.0 air miles northeast of the center of Cincinnati, contains 1,200 acres or 1.9 square miles of a silt loam with poor natural drainage, and permits the extension of four pairs of runways to 7,500 feet if desired. It is located 13.8 driving miles from the heart of the city and is partly occupied by two privately operated airports with the balance in large and small farms and one section subdivided into very small lots. This site would be the most expensive in land acquisition per acre because of the many property owners. Its selection would require the relocation of 2.7 miles of Plainfield Road, part of which would replace 1½ miles of Ohio 126 which would have to be abandoned. Very heavy grading would be necessary to prepare this site for use.

Cornell Road Site

This site has 2,000 acres in Hamilton County and 900 acres in Butler and Warren Counties. In the Hamilton County portion it is possible to build dual 10,000-foot runways for three directions but no east-west runway. East-west dual runways 7,500 feet long are feasible without the relocation of Snyder Road along the east boundary. Much grading would be required but not as much as with the other airport sites except Mulberry and Harrison. The soil is a silt loam with mediocre drainage. If this site were developed it would put out of consideration the Blue Ash and Loveland sites because it is within 3 miles of their centers. This site is made up of a mixture of farms, several of which are 100 acres or larger, and is located 16.3 driving miles from the heart of the city.

Loveland Site

This site consists of 1,175 acres in Hamilton County and 1,475 acres in Warren County for a total of 2,650 acres or 4.1 square miles. It is located 16.3 to 18.9 air miles northeast of the center of Cincinnati and permits the eventual development of dual 10,000-foot runways in four directions. Expansion to the east and north is practical topographically, but to the east would require moving Lebanon Road without sufficient compensating gain, while expansion to the north would require an

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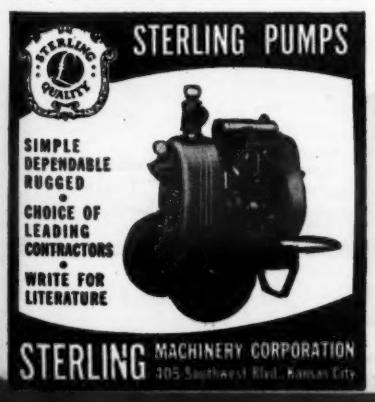

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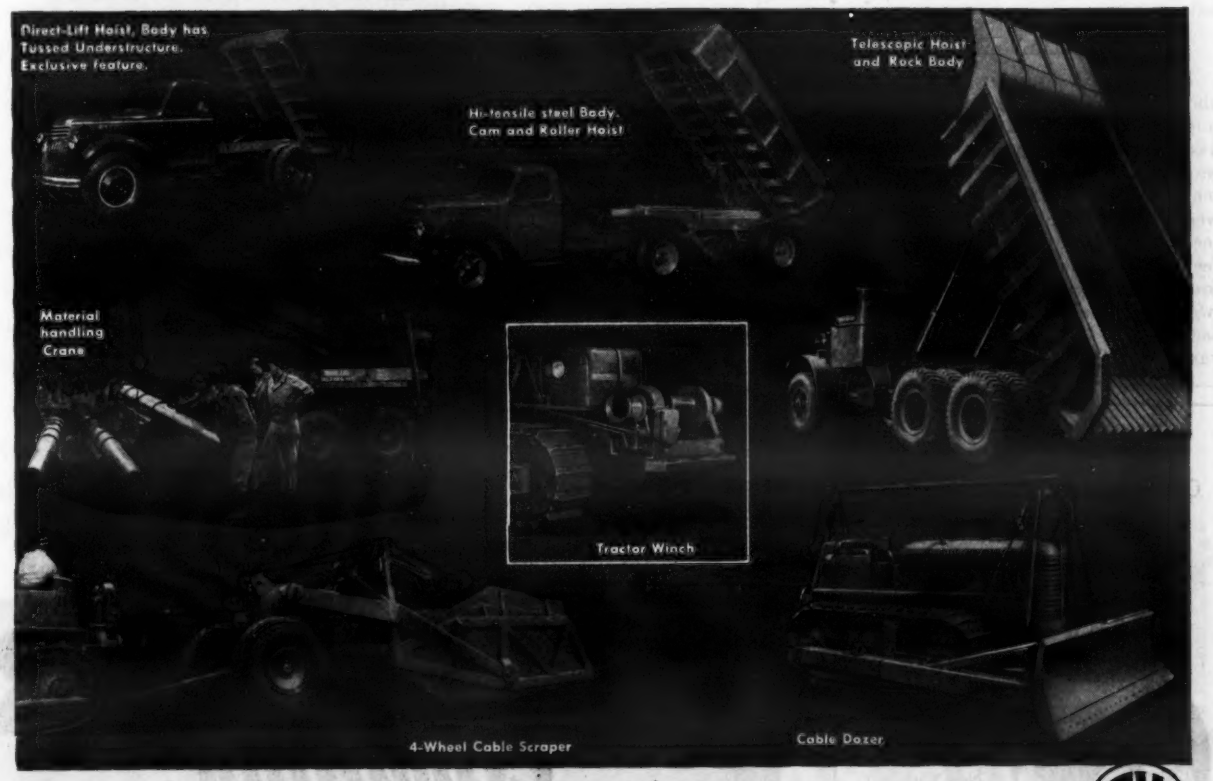
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Cincinnati Prepares To Build New Airport

(*Continued from preceding page*)

unduly great realignment of U. S. 22. This site involves heavy grading in silt loam, a poor draining soil, for a complete development. The Loveland and Cornell Road sites are only 3 miles apart, which is too close for both of them to be used as major airports. At present, farms predominate on the site which is 18.8 miles driving distance over U. S. 22 from the heart of the city.

Mulberry Site

This site is in Clermont County, 15.7 to 23.2 air miles from the center of Cincinnati, contains 11,000 acres or 17 square miles and permits the development of dual 10,000-foot runways or longer in all directions. It is the only site studied which is large enough to permit radial design of the runways. By locating the terminal in the center of the port, there would be a great reduction in the cost of construction of taxiways and in taxiing time. Grading is simple and minor in a silt loam which drains poorly. There is no problem of its proximity to other ports and it is 21.3 miles driving distance from the center of the city. The tract is almost entirely in farms at present and should be the lowest in cost per acre of the eight sites under consideration. No important highway relocation is necessary, although Ohio 132, of only local value, could be shifted to an existing county road easily.

Cherry Grove Site

This site has 300 acres in Hamilton County and 2,150 acres in Clermont County, making a total of 2,450 acres or 3.8 square miles, located 10.2 to 12.5 air miles east of the heart of Cincinnati. Its size permits the construction of dual 10,000-foot runways in all four directions but there would be heavy grading in silt loam which drains poorly. It is 14.0 miles driving distance from Cincinnati, and is made up mostly of farms, with three cross-road villages. The cost of the tract per acre is about the same as the Mount Healthy and Cornell Road sites. There are no Federal or state highways requiring relocation, but Clough Pike would have to be relocated for 2.8 miles.

Existing Lunken Airport

This existing Municipal Airport has about 360 acres in use for airport purposes but could be expanded to 800. It has an existing northeast-southwest runway about 4,000 feet which could be lengthened to 7,500 feet and a northwest-southeast runway of about 4,000 feet which could be extended to 4,300 feet. It is located in a valley with 300-foot hills adjacent. Expansion to permit two more dual runways of 7,500 feet each would require 2,250,000 cubic yards of fill in the river bend, 400,000 cubic yards for a new levee, and additional heavy fill in the existing playfield area. The soil is a good loam with a sandy gravel subsoil and drains well except at the time of rare floods, when it is subject to backwater. It is not in conflict with any of the other airport sites and is 5.9 miles driving distance from the center of the city or 4.5 air miles. The desire to abandon this airport is based on the facts that it is too close to Cincinnati residential areas and also some Kentucky cities, fogs and rugged topography are constant hazards to pilots unfamiliar with the field, and it is in a pocket with hills on almost all sides, which prevents the development of a system of runways permitting takeoffs and landings in different directions in the manner in which new fields are being planned today.

Choice of Sites

As soon as the report on the eight sites in Ohio was released, it was presented to air-line officials for their consideration. As a result of a conference, officials representing practically all of the air lines serving Cincinnati placed the Cornell Road site first, and the Mulberry site second, because of its size, freedom from obstruction, smoke and fog, although it is generally considered to be too far from the center of the city. Cherry Grove was picked as the third possibility, but it is limited for future development, the cost of the land is high, and it is too far from railroad facilities. Air-line officials also said that Blue Ash and Loveland might command attention.

Based on financial studies, City Manager W. R. Kellogg has expressed a preference for the Mason Road site which is 3 miles beyond the generally approved Cornell site and includes the major portion of the Loveland site. It is estimated that both Cornell and Blue Ash would cost well in excess of $3,000,000 to establish, whereas the Mason Road site could be developed at a cost not to exceed $3,100,000. The city is now taking up options on property comprising the Mason Road site but this does not preclude the possibility of the development of other sites which do not conflict with it.

If the recent Civil Aeronautics Administration report is acted upon favorably by Congress, five projects totaling $2,360,000 could be placed under construction in Cincinnati. Tentative plans in the CAA report call for the construction in the Cincinnati area of a Class 4 airport, the next to the largest size, at a cost of $1,700,000. A Class 1 airport, not designated specifically, would be enlarged to a Class 2 airport at a cost of $305,000, and improvements on a Class 1 port would account for another $25,000. A Class 3 port would get $305,000, and a Class 1 airport now under construction would be allowed $25,000.

In the early days of "good roads", about all the public demanded was a road reasonably passable in ordinary weather. Now the public demands highways on which it shall be not only possible to avoid an accident but difficult to have an accident.

—*Stanley J. Williams, National Safety Council*

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Federal Works Agency Photo
Initial concreting of a new sludge-digestion tank for the St. Simons and Sea Island, Ga., sewage treatment plant.

New Sewage Works At Sea Island, Ga.

The construction of a sanitary sewer system and sewage treatment plant to serve sections of St. Simons and Sea Islands, Ga., is now under way. Heavy increases in population following the establishment of Naval air installations on the islands and large expansion of shipyard schedules in nearby Brunswick on the mainland made this work imperative. The application for assistance of the Federal Works Agency was made by the Commissioners of Roads and Revenues of Glynn County, H. J. Friedman, County Engineer-Director.

The project, now under construction, consists of 62,000 linear feet of 8 to 18-inch vitrified-clay sewer lines, 15,300 linear feet of 8, 10, and 12-inch cast-iron force mains, 217 manholes, 4 underground sewage pumping stations, and a primary sewage treatment plant with pumping station, bar screen, mechanical clarifier, sludge tanks, chlorine dilution tanks, drying beds, and approximately ½ mile of electric power line.

The project is a large one for the Brunswick area and involved an original FWA allotment of $261,537 which was later increased to $460,000 when all bids on the contract overran the funds available. The increase in cost was due to the fact that the original estimates were prepared when prevailing and rapidly changing regional costs were lower and before war activities reached a peak. There has also been a vast turnover in qualified labor in the Brunswick area and, as construction consists of wet work, it is avoided by laborers and skilled operators who prefer to accept employment under more favorable conditions.

The contracts were readvertised in June, 1944, and again the bids overran, but they disclosed a slight decrease when the construction time was extended to 180 calendar days. Contracts were awarded to Blythe Bros. Co., Inc. of Charlotte, N. C., and the Espy Paving & Construction Co., of Savannah, Ga. Wiedeman & Singleton of Atlanta are the consulting engineers for this project.

Heavy-Duty Batteries For Starting Diesels

A line of heavy-duty, rapid-discharge storage batteries for starting diesel truck and equipment engines at low temperatures has been developed by The Hand Laboratory, Nyack, N. Y. The Hand 29-plate 175-ampere-hour 6-volt diesel starting storage battery is guaranteed by the manufacturer to deliver a minimum of 1,000 amperes at zero degrees F for four 30-second discharge periods, interrupted by 2-minute rest periods for acid recirculation.

This battery is 16¼ inches long, and weighs 98 pounds wet, fully charged and standardized. Although Hand diesel starting storage batteries are made especially for starting heavy diesel truck engines which must stand for prolonged periods exposed to low temperatures or damp conditions, these batteries are also of value where work is carried on over rough terrain, and where there is excessive vibration, as the cell assembly is very tight, thus reducing plate slap to a negligible degree. Batteries in equipment on road construction, now in their third year of service, are reported to be in excellent condition and giving promise of several more years of service.

These diesel starting batteries, which come in 6, 8, and 12-volt sizes and carry an unconditional guarantee of two years, are obtainable, in limited quantities, through the use of AA-1 MRO Priorities Rating. Complete information may be secured by writing direct to the manufacturer and mentioning this item.

Keep ahead of Schedule with GATKE High-Heat-Resisting Asbestos BRAKE MATERIALS

How do GATKE Brake Materials speed operations and save money? They keep operating and avoid delays. They pick up and release with smooth, positive, non-grabbing action for faster operation—require fewer adjustments.

GATKE Brake Materials are engineered and service proved for every brake and clutch of Excavating, Road Building and Construction Equipment. Just tell us what you need!

GATKE MAKES
Brake Lining
Clutch Facings
Frictions
Non-Metallic Bearings
Sheet Packing

GATKE CORPORATION

224 N. LaSalle St.,
Chicago, Ill.

BLOCK WEAR on shovel parts

STOODY SELF-HARDENING
welds maximum wear protection on
Buckets, Track Pads, Rollers,
Idlers, Drive Tumblers

THERE'S one thing about Stoody Self-Hardening that you'll find extremely handy. A few pounds kept in stock provides efficient wear protection when you need it and wherever you want it! You'll double the life of ordinary manganese bucket lips and runners; teeth are kept sharp and out to size. Stoody Self-Hardening on track rollers maintains full O.D. indefinitely, reduces wear from track slapping and keeps the weight on the rollers rather than idlers and tumblers. Track pad lugs mesh more accurately when hard-faced with Stoody Self-Hardening because they're kept on gauge, avoiding lost time replacing thrown tracks. Idlers and drive tumblers are similarly benefited with longer wear and smoother action.

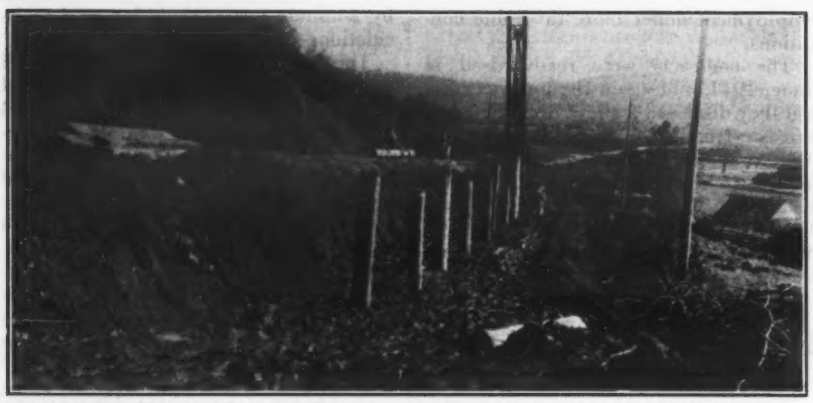
A little Self-Hardening goes a long way too. Solid deposits aren't always necessary—or even desirable. Stringer beads provide effective wear protection on large areas, cut down on hard-facing metal and save hours of welding time. And here are other important considerations: Where you need thick deposits, you get 'em in one pass—up to ⅜" deep with ¼" bare Stoody Self-Hardening. Because Stoody Self-Hardening is related to manganese, it bonds strongly, is so tough along with its high wear resistance that chipping is eliminated. You'll find it one of the easiest of all hard-facing alloys to apply.

We can't think of a better hard-facing alloy for power shovel protection . . . Try 100 lbs. of Stoody Self-Hardening for your own satisfaction! Cost is only 50c per lb., f.o.b. distributors' warehouse. See any of the 600 U. S. distributors for quick delivery.

STOODY COMPANY
1136 WEST SLAUSON AVE., WHITTIER, CALIFORNIA

BUCKETS receive maximum wear protection when Stoody Self-Hardening beads are applied in the same approximate direction as movement of material. When loose earth is handled stringer beads applied in checkerboard patterns increase efficiency.

STOODY HARD-FACING ALLOYS
Retard wear . . . Save Repair



Piles driven 8 to 12 feet below the plane of slippage are used to stop slides in some sections in California.

California Controls Slides and Erosion

(*Continued from page* 1)

and 30-foot piles were ordered. However, at depths of 8 to 12 feet below the plane of slippage, the material encountered was too hard to penetrate with the timber piles, which were driven at 10 to 15-foot centers in a direction parallel to the center line. At this penetration this pile treatment proved effective, as indicated by the fact that this slip-out, which prior to the treatment had subsided several feet each year, has subsequently shown no settlement.

This treatment with timber piles is not feasible in many locations in the District where the slipping occurs along a sloping plane of serpentine, shale, or other material too hard for penetration with wood piles. At slides adapted to the use of wood piles, the results have been so encouraging that steel H-beams may be used, when steel again becomes available, at locations where proper penetration cannot be obtained with timber piles.

However, it should be noted that the pile treatment for slide correction is not applicable to all types of slides, and will be effective only in cases where the slide is so nearly in equilibrium that the piles will increase the shear resistance of the soil sufficiently to prevent further movement. Each slide should be studied and analyzed after borings have been made to determine the subsurface conditions; if the pile treatment is applicable, it offers appreciable saving in cost compared to the usual methods.

Slope-Erosion Treatment

In a location where cut slopes are in a loose sandy material which, under the 60 to 80-inch annual rainfall of the area, it is impossible to maintain against erosion until newly planted and fertilized rye can obtain a foothold, temporary slope protection has been afforded by spreading straw over these slopes to an approximate thickness of 4 inches. Long handles of shovels are used as rams to punch this straw on 2-foot centers into the yielding sand slopes with sufficient force to hold it in position until the rye can take over the job of slope protection.

This rye is sowed by hand at a rate of about 0.4 pound per 100 square feet and fertilized with Milorganite at the rate of 3.0 pounds per 100 square feet.

A. M. Nash is District Engineer of District No. 1, California Division of Highways, with headquarters at Eureka, and E. M. Cameron is District Maintenance Engineer.

Davey Dealer News

The Major Equipment Co., 919 Woodlawn Ave., Cambridge, Ohio, has been appointed a distributor by the Davey Compressor Co., Kent, Ohio, maker of a line of portable and stationary compressors, heavy-duty truck power take-offs, and pneumatic saws. The southeastern counties of Ohio comprise the territory covered by this new distributor.

The Baltimore, Md., branch of Paving Supply & Equipment Co., Davey dealer in that area, has moved to a new building, in order to provide additional sales and service facilities for Baltimore and Washington, D. C., contractors. This newly organized branch will continue to handle the complete Davey line.

The southern counties of Alabama and the counties in western Florida around Pensacola will be covered by Wallace R. McKinney, Jr., 154 So. Franklin St., Mobile, Ala., which firm represents a number of nationally known manufacturers of construction equipment.

Davey representation in the states of Maine and New Hampshire will be in the hands of the Sales Division of the Murray Machinery Co., 169 State St., Augusta, Maine. This company is headed by James A. Murray, President, who was at one time connected with the Lane Construction Co., Meriden, Conn.

The Ohio Muf-L-Cote Co., 71 S. Broadway, Akron, Ohio, has been named to handle the Davey industrial compressor line in the Akron, Canton, and Massillon areas.

Shunk
Superior Quality
BLADES
AND CUTTING EDGES

For any make of machine
Motor Graders, Maintainers, Scrapers, Drags, Bulldozers, Backfillers, Wagon Scrapers, Trail Builders, Trail Blazers, Carryalls, Also—

CUTTING EDGES
WEARING BOOTS
BACK SLOPERS
EXTENSION BLADES
MOLDBOARDS
and
SCARIFIER TEETH

30 years of manufacturing blades has developed for you a special steel, milled through our own rolls and forged at the edges to give that extra wearing quality you need.

All widths lengths, and thicknesses. Punched ready to fit your machine.

Consult your internationally recognized Blade Specialists. Write for special bulletins, giving type and name of machines you operate—get set for Blades early.

Shunk
MANUFACTURING COMPANY
Established 1854
BUCYRUS, OHIO

HOW A B G BUCKET LOADER CUTS COSTS FOR THE CONTRACTOR!

● Any contractor knows that the continuous operation of a bucket loader yields a higher yardage of bulk material at a less cost than any other method of loading. But, the cost of operating a Barber-Greene Bucket Loader is lowest of all. Here are a few of the long-life and time-saving features that keep expenses at rock bottom:

1. Strain and damage to boom frame are prevented because the thrust of loading is transmitted directly to the crawlers through push arms.
2. Clean pick-up, requiring no additional hand labor, is assured by the automatic follow-up scraper.
3. Wear of working parts is reduced with use of a double transmission that permits 12 crowding speeds.
4. An automatic overload release prevents breakage of operating units.
5. Points of greatest wear on the buckets are faced with an abrasion-resisting weld.

For complete details see your B-G representative or write the Barber-Greene Company, Aurora, Illinois.

45-02

Barber-Greene B G Constant Flow Equipment

Surface Treatment For Syracuse Road

State Fair Blvd. Within City Limits Gets Tar and Stone Wearing Course On Old Concrete Pavement

♦ MAINTENANCE forces of the Public Works Department of Syracuse, N. Y., recently surface-treated the 2-mile stretch of State Fair Boulevard extending from West Genesee Street northwest to the city line, connecting with State Route 48. Although the annual State Fair at Syracuse was not held in 1943 nor 1944, because of the war, this section of pavement has received its share of pounding by traffic from the Army Base now occupying the State Fair Grounds located on State Fair Boulevard 1½ miles beyond the city limits. The road surface is a 20-foot-wide concrete pavement with 5-foot dirt shoulders stabilized with run-of-crusher gravel.

Both pavement and shoulders were surface-treated by an application of road tar No. 3 at the rate of 0.3 gallon to the square yard. The tar was applied at a temperature of 100 degrees F by a bituminous pressure distributor from the Barrett Division plant in Syracuse. The 1,200-gallon tank was mounted on a Brockway truck on the rear of which was a 10-foot spray bar. A Schramm compressor, part of the unit, sprayed the tar at a pressure of 20 pounds to the square inch.

This tack coat was immediately covered with ½-inch stone at the rate of 15 pounds to the square yard. The preferred stone in this operation is ¼-inch but difficulty was experienced in obtaining the smaller-size stone from the crushers. The Public Works Department hired four 8-ton trucks to haul this stone from the Solvay Process Co. plant at Jamesville, 9 miles south of the city. The road material is a by-product in the processing of lime rock. A city-owned spinner-type stone spreader was hooked on the tailgate of each truck and was fed by two men with shovels working in the truck. This spreader passed over each 10-foot strip two or three times until the tar was completely covered by a layer of ½-inch stone. Because of the labor shortage, no roller was used; road traffic furnished the necessary compaction.

Traffic was maintained during the operations, as only one 10-foot strip was treated at a time. As soon as the stone was spread, traffic was permitted on the road.

Syracuse has about 158 miles of gravel streets which receive this form of tar and stone surface treatment every other year. The maintenance work is under the supervision of Raymond H. Dodge, First Deputy Commissioner. The State Fair Boulevard job was supervised by H. R. Holl, foreman. George Ballantyne is Syracuse Commissioner of Public Works.

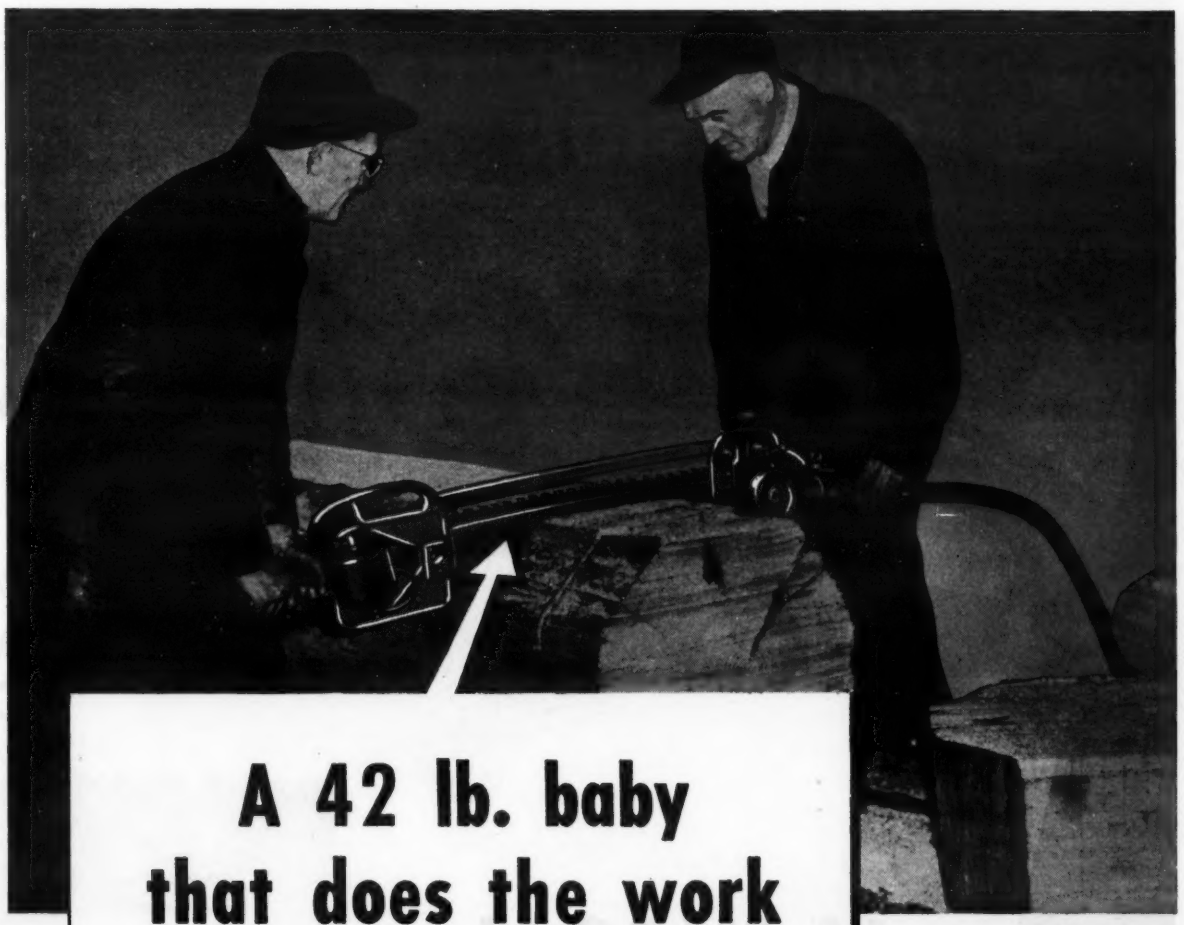
Wickwire Names Rairden Wire Rope Sales Manager

The Wickwire Spencer Steel Co., New York City, has announced the appointment of A. S. Rairden as Sales Manager of the company's Wire Rope Division. He has been associated with Wickwire Spencer for 10 years as Sales Engineer and Wire Rope Sales Manager.

As a member of the Manufacturers Committee, Mr. Rairden assisted in the preparation of wire rope specifications for the National Bureau of Standards and the Army and Navy aeronautical branches. He is also the author of many articles and scientific treatises on wire rope application.

U. S. A.A.F. Official Photo

The versatile bulldozer turns to still another service—fire fighting. Here Aviation Engineers at the headquarters of the 21st Bomber Command run a tractor bulldozer into a burning B-29 to push dirt over the flames after a Jap air attack.



A 42 lb. baby that does the work of 10 men!

Cutting an octagonal boom of 24 inch Oregon fir, after having made longitudinal slab cuts.

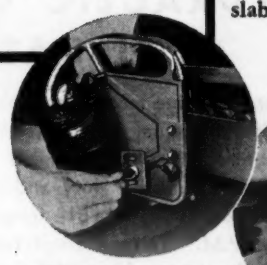
For construction that involves heavy cutting, for clearing roads, or any work having to do with sawing or felling trees or heavy timbers, the new Lombard air-driven chain saw is the baby that does the job of ten men.

Weighing only 42 pounds — 10% less than other makes — this husky air-driven, 24 inch tool goes through soft wood at an average of about an inch a second—hard wood in about double this time. Cuts a clean, even track. Operates from a standard 105 cu. ft. compressor. Ideal for under-water cutting. Will cut standing trees within 2 inches of the ground.

Inexperienced hands find it easy to operate. It cuts readily at any angle. Safety guard offers full protection. New quickly detachable helper's end and new quick-change interlocking chain are exclusive with Lombard's advanced engineering design.

Also available in 3 h. p., 60 cycle, 220 volt, 24 inch and 36 inch cutting blades. Write for literature.

Dealer Opportunities in Some Areas



NEW EASILY DETACHABLE HELPER'S END WITH ONE-SHOT LUBRICATION

NEW QUICK-CHANGE INTERLOCKING CHAIN

LOMBARD

GOVERNOR CORPORATION

ASHLAND, MASSACHUSETTS

When repairing any of your equipment in the field or in your shop, use Tournaweld. Easy to apply. Stands up in hardest service. Available in 7 types—sizes ranging from 1/8" through 5/16", to meet all heavy equipment welding requirements. Developed and produced by LeTourneau for the manufacture of heavy-duty equipment. A premium rod designed for a special purpose ... it will pay you to use Tournaweld on your LeTourneau and other construction rigs. TW1

See Your

LeTourneau Distributor

R. G. LeTOURNEAU, INC.

Peoria 5, Ill. Stockton, Calif.

A new small revolving-field alternating-current generator.

New Small Generators

A new line of small ac generators of the revolving-field type has recently been announced by the Electric Machinery Mfg. Co., 1331 Tyler St., N. E., Minneapolis 13, Minn. Built in ratings of 6.25 kva, 1,800 and 1,200 rpm, to 18.7 kva, 1,800 rpm, in single and 3-phase, standard and close regulation, 120, 120/208, 240, and 600 volts, these generators can be supplied as two-bearing units for belted or coupled duty, or single-bearing for close coupling to the driving engine. Drip-proof generator and exciter construction is standard.

Among the features of these generators are their rugged construction, designed to withstand heavy-duty service on stationary or portable power units; enclosed ball bearings and cartridge-type bearings with sealed lubrication for trouble-free operation; high-torque dampers to keep parallel-operated generators running smoothly; revolving-field construction similar to that used on this company's line of large generators; easy access to the exciter brushes for inspection; and a slip-on louvered cover.

Further information on this line of ac generators may be secured by those interested direct from the manufacturer. Just mention CONTRACTORS AND ENGINEERS MONTHLY.

New Worthington Officers

The Board of Directors of the Worthington Pump & Machinery Corp., Harrison, N.J., has elected Clarence E. Searle President of the corporation, to succeed Harry C. Beaver who was elected Vice Chairman of the Board of Directors and Chairman of the Management Committee.

Hobart C. Ramsey, Vice President in charge of operations, was elected Executive Vice President; Edwin J. Schwanhausser, Vice President in charge of the corporation's manufacturing and sales operations in Buffalo, was made Vice President in charge of sales; and Leslie C. Ricketts, Manager of the Harrison Works, was elected a Vice President.

Mr. Beaver has been President of Worthington since 1931, and Mr. Searle has been Vice President in charge of sales since joining the organization in 1932, following a long period of service in various executive capacities with the Allis-Chalmers Mfg. Co.

Less "SEAT FAG" means MORE WORK Per Man Per Day!

By reducing operator "Seat Fag" in your shovel work, you can very definitely get *more work per day* out of your very limited available manpower. Milsco CUSHION SEATS are the answer.

The comfortable, form-fitting contour of the Milsco seat is heavily upholstered and covered with either genuine black leather or duck. Milsco seats are designed to fit both the operator and the equipment. Hinge attachment makes it ideal for use on cranes or shovels where cab space is restricted.

Write for your copy of *Milsco File Folder 44-A.* Describes and illustrates our complete line of Cushion Seats which are *immediately available.*

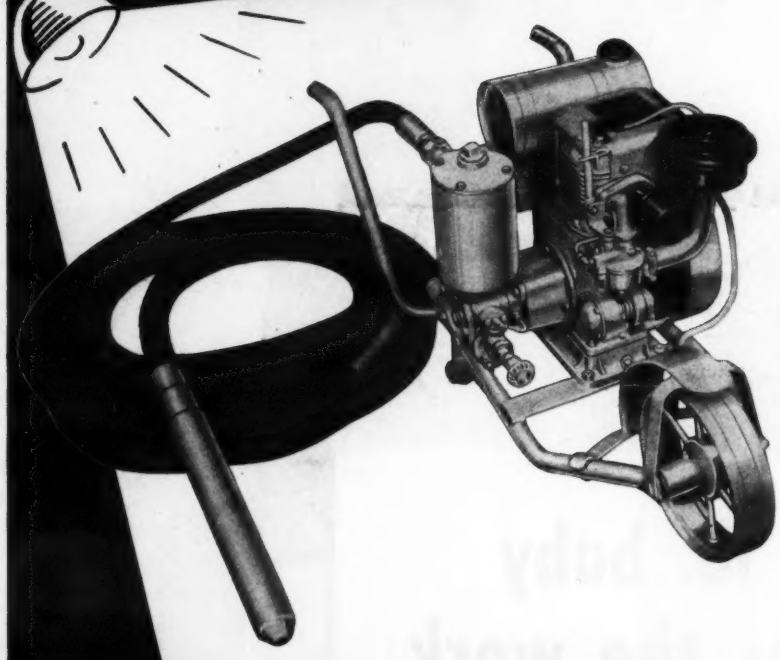
MILSCO MANUFACTURING CO.
2758-F N. 33rd Street • Milwaukee 10, Wisconsin

No. 813 Bucket Type Cushion Seat with back rest.

No. 763 Semi-Bucket Type Pony Seat.

Milsco MILWAUKEE Cushion Seats FOR FARM AND INDUSTRIAL EQUIPMENT

for GENERAL CONCRETE CONSTRUCTION

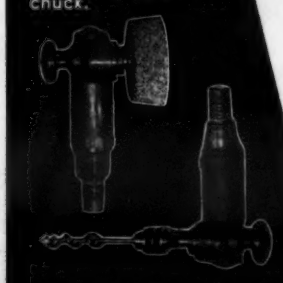


JACKSON
HYDRAULIC CONCRETE VIBRATOR

For years, the most dependable and efficient, all-around internal vibrator for the general concrete contractor. Vibrator head size 2¾" x 21" — right for heavy duty and wide range of conditions. Adjustable frequency — 4000-7000 V.P.M. Correct amplitude and frequency. Continuous forced lubrication of all vibrator parts. Oil-powered, gas engine — hydraulic pump drive. Husky Wisconsin engine — 4.7 H.P. The leader in the famous Jackson Pioneer Line for years — the Jackson Hydraulic Vibrator is built to take it under severe, continuously operating working conditions, at lowest cost of maintenance.

THERE IS A RIGHT JACKSON CONCRETE VIBRATOR FOR EVERY JOB

Concrete grinder attachment quickly interchangeable with hydraulic vibrator head, for wet or dry rubbing. Easily converted into boring tool or drill with three jaw chuck.



ELECTRIC TAMPER & EQUIPMENT CO.
LUDINGTON MICHIGAN

MECHANICS Roller Bearing UNIVERSAL JOINTS

. . . are husky enough to drive the heaviest duty power take-off machines . . .

Our 3 RA universal joint is strong enough to stall any tractor. It requires only once-a-season lubrication. Now is available with the "Standardized hitch". Let our engineers show you how sturdy MECHANICS Roller Bearing UNIVERSAL JOINTS can help increase the utility and dependability of your new or improved earth moving machines.

Mechanics Universal Joint Division
BORG-WARNER CORPORATION 2026 Harrison Avenue Rockford, Illinois

MECHANICS Roller Bearing UNIVERSAL JOINTS ARE SERVING IN

Maintenance Policies For Wisconsin Roads

Priority Use of County Equipment On State Highways Aimed to Raise Quality of Machinery Purchased; Betterments by Contract and County

✦ THE Wisconsin state highway system, comprising about 10,000 miles of which half is concrete, 20 per cent intermediate-type bituminous surface, and the balance low-type bituminous surfacing, is maintained entirely by the county highway departments. The State Highway Commission of Wisconsin has no investment in graders, asphalt plants, gravel plants, and similar equipment; hence, no organization for their operation and no facilities for their upkeep. This policy of having all routine maintenance performed by the county organization, and paying for it by pre-established and standardized rental rates for equipment and hourly wages for labor, permits the individual counties to own equipment superior in quality and quantity to that which they could afford solely from their own highway revenue, and thus have available efficient equipment and trained personnel for the maintenance of the county road systems.

Whenever a new piece of equipment becomes available, rental rates for its use are established, sufficient to cover depreciation, repairs, fuel, lubricants, and readiness-to-serve. Maintenance work on the state system is generally given prior claim to the use of the equipment, and its use on the state system is ordered, with general directive supervision, by the Division or Central Office maintenance engineers.

A similar policy of non-ownership of equipment applies to passenger automobiles used by Commission employees. One state-owned automobile is provided for the use of the Highway Commission, but all cars used by headquarters and division office engineers, as well as those used on the projects, are privately owned and paid for on a mileage basis. A flat rate of 5 cents per mile is allowed where monthly operation is less than 600 miles. Where the monthly mileage exceeds 600 miles, reimbursement is made by a graduated allowance ranging from $21 to $30 plus cost of fuel and lubrication.

Betterment Operations

Betterment maintenance is performed by a combination of contract work and use of county-owned equipment. On one job observed on Trunk Highway 83 between Hartford and U. S. 41 in Washington County, in southeastern Wisconsin, a contract had been awarded to produce and windrow 4,000 cubic yards of gravel per mile along the edge of the road. This gravel was later spread by county-owned equipment and compacted by traffic rolling, after which the top 2 inches was bladed into a windrow 10 or 12 feet wide and shot with either MC-3 or RT-7 or 8 and blade-mixed under traffic. Usual practice calls for a total bituminous content of 15 gallons per cubic yard, or about 6 per cent, and this is shot in three or four applications, with blade mixing between shots. The completed road-mix is then spread and rolled.

Wisconsin is blessed with enormous quantities of glacial gravels, which permit economical production and minimum hauls. Specifications vary somewhat in different localities but usually require crushing to a maximum size of 1½ inches and that 35 per cent of the material retained on the No. 4 sieve show at least one fractured face. The usual maximum size of gravel in the natural deposits is 6 inches.

Wisconsin has experienced considerable success in the bituminous resurfacing of concrete roads even though they may be seriously broken and damaged. The prerequisite for success seems to be the use of a 2-inch minimum bituminous cover. Thinner surfacing has not proved successful over broken concrete.

Since many concrete roads were built in the early days when 16 to 18-foot widths were considered sufficient, bituminous widening of 2 to 4 feet is placed on each side.

Personnel

E. L. Roettiger is State Highway Engineer of the State Highway Commission of Wisconsin, with A. T. Bleck as Construction Engineer and William Hoenig as Maintenance Engineer.

Light Chain Blocks For Shop or Field

Lightness of weight is a feature of chain blocks which appeals to equipment men everywhere. By means of new modern design and the liberal use of alloy steel and steel stampings, the Budgit Chain Block Division of Manning, Maxwell & Moore, Inc., Muskegon, Mich., has shed weight from all four sizes of its Budgit chain blocks without sacrificing their rugged construction. The ¼ and ½-ton-capacity chain blocks weigh only 48 pounds while the 1-ton and 2-ton blocks weigh only 59 and 81 pounds respectively, so that one man can easily carry even the largest size.

Complete information on the mechanical advantages, operating characteristics, and prices of Budgit chain blocks will be found in Bulletin No. 357 which may be secured direct from the manufacturer by mentioning this item.

The 1-ton-capacity Budgit chain block weighs only 59 pounds.

This symbol means: "Product of INTERNATIONAL HARVESTER"

It is the Mark of EXPERIENCE and SERVICE

INTERNATIONAL HARVESTER is proud that all its peacetime products are vital, basic, and *essential*—even in a national economy geared to war.

In these war years Harvester has also built millions of strange new precision machines that are purely implements of war. These we shall build so long as there is need.

There will be an end to them when Victory is won.

But for the things that are traditionally Harvester's, there will be *a new beginning.*

International Trucks, TracTracTors, Wheel Tractors, and Industrial Engines will play a major part in the making of the Post-War world. As all of these are fighting, now, on battlefront and home front, they will fight to insure a greater future for America.

Let THIS MARK—the symbol displayed here—be your guide when you have need for products such as these that Harvester builds.

It is a new mark for an old name, known to all the world—INTERNATIONAL HARVESTER.

It is the symbol of a reputation which shall rise to whatever heights the united people of America may choose to reach in their own march to the future.

This you may take as Harvester's pledge to Industry.

INTERNATIONAL HARVESTER COMPANY
180 N. Michigan Ave. Chicago 1, Illinois

OUR JOB TODAY Let's all remember that our job today—the job of all of us—is to fight harder on the home front . . . fight on the food front . . . give to the blood bank . . . buy extra War Bonds . . . fight inflation . . . for VICTORY.

SAVE 50% ON FUEL AND WAITING TIME when Heating & Melting Tar & Asphalt

USE AEROIL THE FAMOUS **HEET-MASTER**

55, 80, 115 and 165 gallon sizes on skids, on steel wheels and on pneumatic tires. Send for FREE Bulletin No. 260CE (specifications, prices, etc.)

AEROIL BURNER CO., INC.
5775 Park Avenue, West New York, N. J.
Chicago 16 San Francisco 7 Dallas 1

Maine Bridge

(*Continued from page 1*)

dinand Cyr, the contractor, was bitten twice by a nervous dog who rightly associated his movements at the blasting machine with the resulting explosion. After two trips to the hospital, Cyr had the dog tied and blasting continued without further incident.

Using Old Abutments

The jackhammers were used to remove the old bridge seats on the abutments, and trench for the new abutment face was excavated by a ¾-yard Bucyrus-Erie Dragshovel rented from the town. Forms for the new abutment face were built 1 foot out from the old abutment wall and consisted of 1¼ x 8-inch boards of varying lengths, backed by 2 x 4 studs spaced on 18-inch centers. These were supported by double 2 x 4 wales braced by assorted timbers. Twisted wire was used for form ties. A sand-bag cofferdam kept the forms dry, but during concreting a 2-inch Rex pump took care of leakage.

Local stone was used as aggregate in the concrete, but a desirable grade of sand was brought in from Bangor, Maine, since Aroostook County sand does not meet State specifications. The aggregates were weighed on a 2-beam Gaston platform scale placed in front of the Jaeger 2-bag mixer. Water for the concrete was taken from the stream by a 2-inch Gorman-Rupp pump. Rubber-tired wheelbarrows were used to deliver the cement, sand and stone to the mixer. The mix by weight was 94:230:400 pounds for the abutment pour, and 94:220:360 for the deck slab. Concrete was delivered to the forms in a buggy and chuted to place.

The revamped abutments are 32 feet long x 2 feet wide at the top, with a batter of 1 inch in 1 foot on the face and 4 inches in 1 foot on the back. These tie in with the new wing walls which replace the old timber cribbing along the banks of the stream. The new walls are 1 foot 3 inches thick and are 17 feet long on the downstream side and 15 feet long on the upstream side. Like the abutments, the walls are 10 feet high but slope down to 7 feet high at the ends. French drains were placed behind the abutments and riprap was placed along the wing walls to prevent scour.

Pouring Beams and Deck

Falsework for the deck forms consisted of five rows of five 6-inch logs braced and resting on ledge rock and capped by 8 x 8's. The caps carried the 8 x 8-inch stringers, with two stringers under each of the five reinforced-concrete beams. The deck and beams were poured together. Each beam is 1 foot 7 inches wide x 2 feet 6 inches deep. They support an 8-inch reinforced-concrete slab designed for H-20 loading. The clear span of the bridge is 33 feet 3 inches with a 29-foot width, 26 feet of which is a roadway with a concrete wearing surface 5 inches thick at the center and 3 inches at the sides. The curb on each side was poured with the slab but the bridge rail is precast concrete. With lumber hard to obtain, the contractor went into the Maine woods and cut cedar logs for guard-rail posts for the approaches.

Each 50-foot-long approach at either end of the bridge has an 18-inch gravel base with a 2-inch bituminous-treated gravel surface 24 feet wide.

Quantities and Personnel

Engineers' estimates of the major quantities on which bids were taken for this $13,888 bridge at South Houlton, Maine, were as follows:

Item	Amount
Excavation	740 cu. yds.
Concrete, abutments and wing walls	140 cu. yds.
Concrete, superstructure	63 cu. yds.
Concrete, roadway wearing surface	12 cu. yds.
Reinforcing steel	16,300 lbs.
Cement	300 bbls.

C. & E. M. Photo
The new bridge over Hodgdon Stream at Houlton, Maine, during construction, showing the falsework.

Work was started on May 9, 1944, and required three months to complete. The Resident Engineer for the Maine State Highway Commission in charge of the bridge construction was Gerald Welch. The contractor was Hector J. Cyr, Inc., of Waterville, Maine. The bridge was designed under the direction of Max Wilder, Bridge Engineer for the Commission, of which Lucius D. Barrows is Chief Engineer.

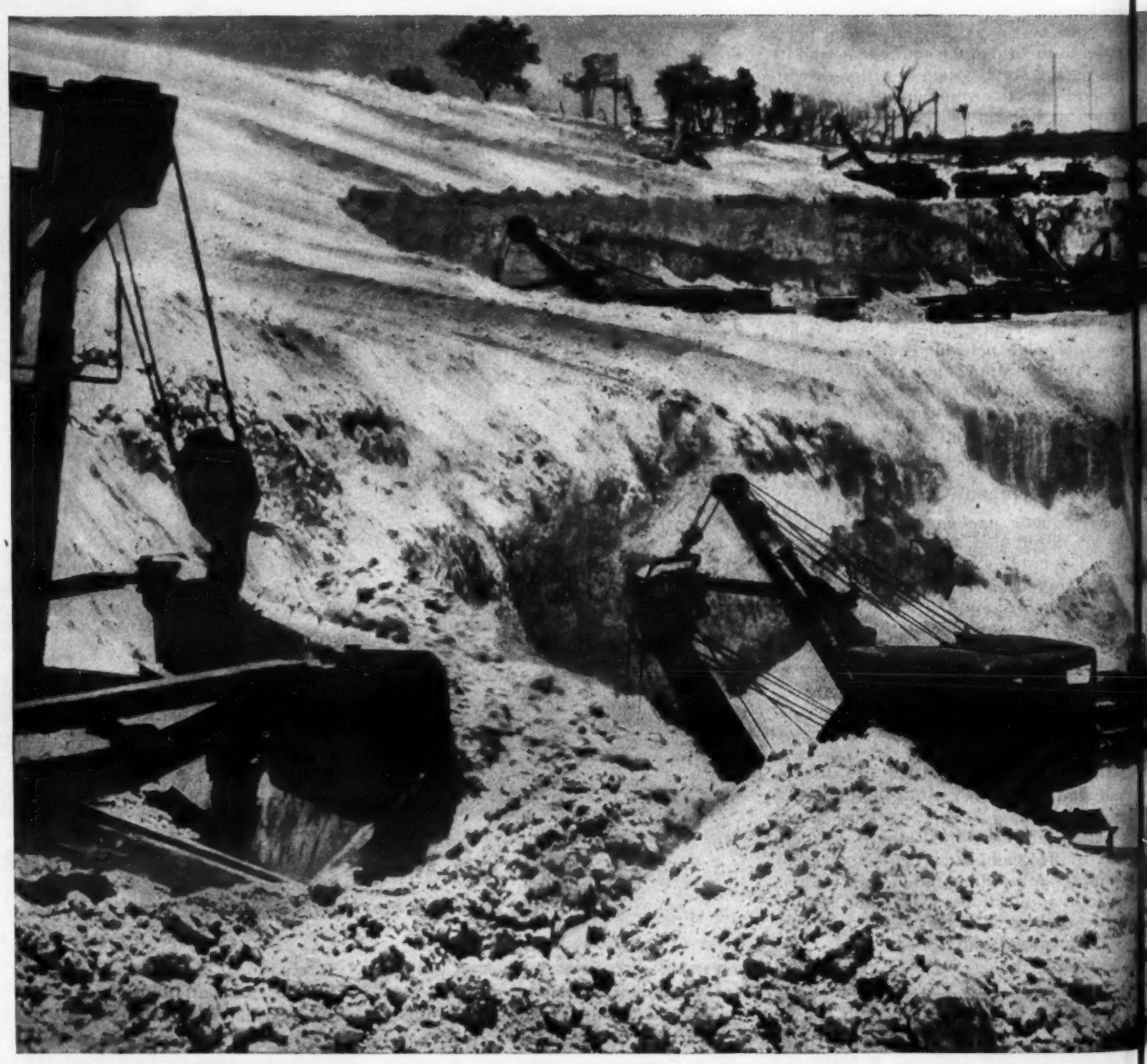
March is Red Cross month.
Give generously to the 1945 War Fund.

Hewitt Rubber Expands Rubber-Products Output

Announcement has been made by the Hewitt Rubber Corp., Buffalo, N. Y., that its recent expansion program will permit an increased output of conveyor belts, transmission belts, and many types of industrial hose, as well as an entry into the field of molded rubber articles for use in industry. Wartime requirements have greatly expanded the facilities of this firm, and the new equipment at its Buffalo plant more than doubles the pre-war capacity of mixing rubber and of forming the raw stocks into sheets.

Production facilities will be devoted to war equipment until victory is achieved, the company states, but it is now looking to the future to maintain its high level of employment in the post-war period and is planning to that end. When all military requirements have been met, Hewitt can move quickly into volume manufacturing of rubber products for civilian use.

Building a B-29



TEXACO

TUNE IN THE TEXACO STAR THEATRE WITH JAMES MELTON SUNDAY NIGHTS

Ford Is New Director Of Highways in Ohio

Perry T. Ford of Columbus has been appointed Director of the Ohio Department of Highways, succeeding Hal G. Sours who was named Director in 1940 when Major General Robert S. Beightler assumed command of Ohio's 37th Division. Mr. Ford, who is the sixteenth Director of Highways since the Department was created in 1904, served as a division engineer in the Department during the administration of Gov. James M. Cox and was at one time Engineer of Putnam County. He also was Chief Engineer of the Pan American Engineering Co. and was assigned to Cuba for eight months, supervising governmental construction work.

Mr. Ford has served as President of both the Ohio Society of Professional Engineers and the National Society of Professional Engineers, and is a member of the Society of Professional Engineers of France. He has been Assistant Secretary of the State Professional Engineers and Surveyors' Board, Vice President of the National Council of State Boards of Engineering Examiners, and is the founder of *Engineering Age*, the professional publication of the Ohio Society of Engineers.

Some of the grading equipment used to improve Ross Field, an airport serving Benton Harbor and St. Joseph, Mich.

Goodrich Establishes Two New Sales Districts

Two new districts, with headquarters in Indianapolis, Ind., and Birmingham, Ala., have been established by the Tire Division of The B. F. Goodrich Co., Akron, Ohio. The company now has twenty-eight districts in its national sales organization for tires, tubes, batteries, and similar merchandise.

C. W. Cordry, who has been named Manager at Indianapolis, joined B. F. Goodrich in 1937, and has served in various district sales posts, the most recent being general supervisor in the Cincinnati district.

D. M. Tatem, new Manager of the Birmingham district, became district operating manager in Atlanta, Ga., in 1937, and was made general supervisor in 1944. He joined the company in 1928 in the Philadelphia district.

New Airfield Speeds Produce to Market

Ross Field in Michigan Developed By $250,000 Contract for Modern Facilities; Will Aid in Marketing Fresh Fruits and Vegetables

✦ TO take advantage of an airport transport system in marketing fresh garden produce, St. Joseph and Benton Harbor, Mich., industrialists have promoted the development of Ross Field, to be one of the finest airports in the locality, as a step towards post-war profits and community prosperity. The field will consist of four paved runways, two 3,600 feet, one 3,400 feet, and the fourth 3,200 feet long and all 100 feet in width, and will have modern buildings and hangars.

Grading and paving contracts were awarded to John J. Yerington, Benton Harbor, Mich., and the grading contract was sublet to Carl Goodwin & Sons, Allegan, Mich. The latter used a fleet of Caterpillar diesel tractors and scrapers to handle the 150,000 yards of sand involved in the improvement of the airport. Working a 10-hour day, these units moved 5,000 cubic yards a day on a 700 to 800-foot haul.

How Project Started

Located in the heart of the fruit belt of southwestern Michigan and separated only by the St. Joseph River, the twin cities of St. Joseph and Benton Harbor possess one of the midwest's greatest fruit and vegetable markets. In the past, much produce has been lost due to lack of speedy transportation facilities. Progressive citizens decided to do something to cut down this waste and, to this end, leading industrialists are developing Ross Field.

Chief among the backers of this project is H. B. Ross, head of the Ross Carrier Co., who is the principal donor of the land being used. Financing has been primarily by industry, with some state aid. Approximately $250,000 is being expended on the improvement of the field. Operation of the field will be supervised by a board chosen jointly from both cities.

This step towards a practical solution of the problem of marketing perishable goods is a step towards a healthier, happier, and more prosperous standard of living for all.

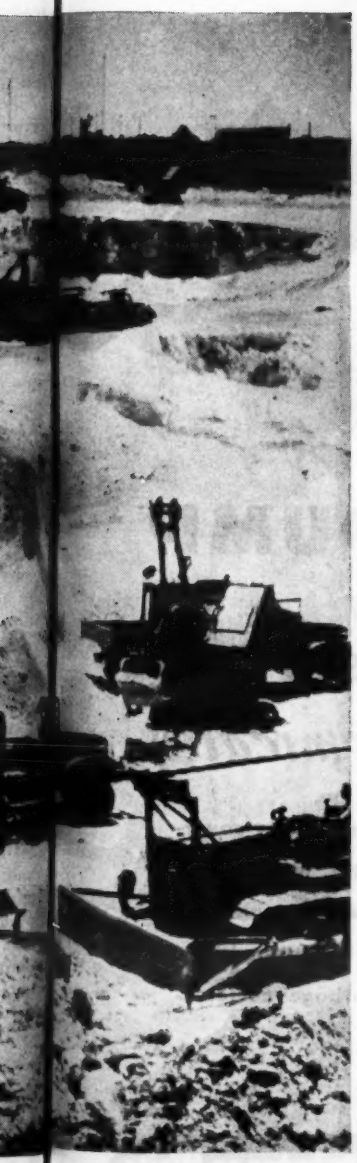
Black and White Prints Quickly Made, Easily Read

Positive reproductions of specifications, plans, drawings, and records can be obtained directly from the subject in one simple operation by the BW process of direct printing, according to a 28-page brochure just received. Besides the time-saving element, these black and white prints are reported to be more readable, since black on white is easier on the eye than a negative reproduction, and the process of checking, correcting, and amending the solid black lines on the white background is much easier than on the usual negative blueprint, which is easily blurred and, for the layman, difficult to interpret.

Several types of BW developers and printers are described and illustrated, including a combination printer and developer unit with a patented feature which automatically separates the print and the subject to be reproduced, allowing the latter to return to the operator while the exposed print proceeds to the developing section. Complete specifications are given.

State and county highway engineers and contractors who wish to secure copies of this informative brochure should write direct to Charles Bruning Co., Inc., 4700 Montrose Ave., Chicago 41, Ill.

base in 158 days



WORKING under enemy fire, Army engineers began converting Saipan into a B-29 base on D-day plus 5. Only 158 days later, Superfortresses took off for their first Tokyo raid. Using swarms of bulldozers and shovels — part of the 9,000 tons of construction equipmen brought ashore — coral for surfacing runways was quarried and delivered on a round-the-clock schedule *one truckload every 40 seconds!*

Whether used on the fighting fronts or the home front, efficient, trouble-free performance of construction equipment depends on effective lubrication. That is why experienced contractors everywhere use Texaco.

Texaco Marfak, for example, used in your tractors, shovels, bulldozers, trucks, etc., provides ideal film lubrication inside a bearing yet maintains its original consistency at the outer edges . . . sealing itself in, sealing out sand, dirt, water. Its tough adhesive film cushions bearings against road shocks. Makes parts last longer.

For wheel bearings, use *Texaco Marfak Heavy Duty.* It stays in the bearings — off the brakes. Seasonal repacking is no longer required.

Texaco lubricants have proved so effective in service they are definitely preferred in many fields, a few of which are listed below.

Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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★ *More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.*

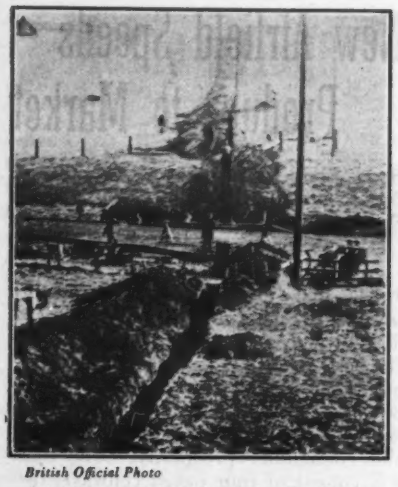
★ *More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.*

★ *More revenue airline miles in the U. S. are flown with Texaco than with any other brand.*

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

METROPOLITAN OPERA BROADCASTS SATURDAY AFTERNOONS



British Official Photo

A section of Britain's 1,000-mile oil pipe line being laid across a main road.

A Pipe-Line Network Fuels Allied Planes

To meet the needs of the Allied forces, Britain has been made into a great military oil dump. According to Geoffrey Lloyd, Parliamentary Secretary of Britain's Ministry of Fuel and Power, "It has not only been a question of importing petroleum in quantities never previously approached or imagined. Once here, oil must be rapidly discharged, distributed, and stored." Since 1941, Britain has constructed an elaborate inter-connecting pipe-line system 1,000 miles long, and studded with scores of secret underground storage tanks, capable of holding large reserve stocks. Already no less than 2,400,000,000 gallons of oil, including hundreds of millions of gallons of "aviation spirit" have been carried to the principal centers of consumption, especially airfields.

Although the ever-growing needs of the RAF were in mind, the first part of the network to be laid down was a line to link the southwest oil ports with the London area. This pipe line was not intended for aviation gasoline, but rather to furnish help by leaving the British railways free to carry the increasing quantities of gasoline needed by RAF Bomber, Fighter, and Coastal Commands. The terminal depot opened on December 5, 1941, six months after the preliminary work on the line had been begun. The next section of the plan was the linking in of the oil ports of the northwest coast, which was achieved by a pipe line from this area running southwards to join the first line.

Facilities for pumping in either direction were provided and storage depots were linked into the pipe line. In the event of damage to either west-coast oil terminal, supplies, with an additional line, were available and could be pumped from the north or south, and the eastern area was thus provided with two sources of supply. This second line was operational on May 30, 1942.

For the needs of D-Day, the next move was to make these new facilities available by linking in what were to become invasion bases. In the early summer of 1942, a spur from the original line was run to the south coast. Forty miles of the line, started May 1, began operation June 30.

The maximum line laid in any one week was 18 miles of 10-inch pipe. The best sustained effort was 125 miles of both the 10-inch and 8-inch in 84 days. More than half the system consists of 8-inch pipe and more than one-quarter of 10-inch. The short stretches of spurs consist of 12, 8, or 4-inch pipe. Practically all the pipe lines are designed to work at a pressure of 600 pounds per square inch, using comparatively light steel pipe, to save steel.

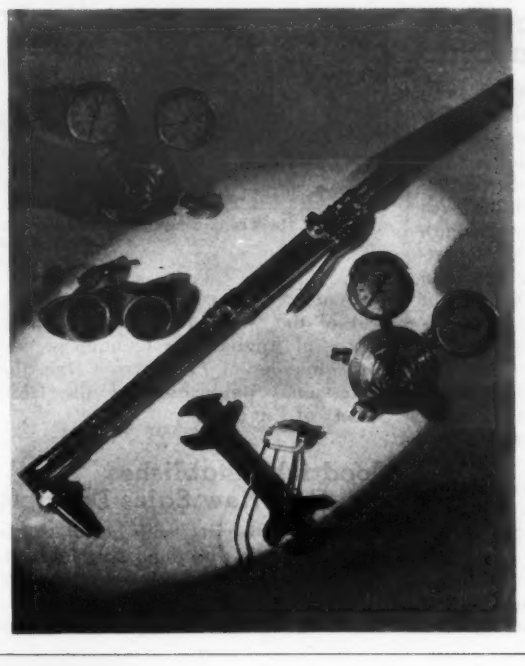
In normal construction, every joint in a pipe line is butt-welded, but this pipeline system had to be built without welders, as none could be spared from the shipyards. In place of welded joints, special couplings were used, which allow a certain amount of expansion in the line.

The pipe line cost about $28,000,000 and required the use of 80,000 tons of steel. It was British in conception, planning and execution, and the work of British engineers employing British-made material and British labor throughout.

Spicer Equipment at War

A 36-page brochure, beautifully illustrated in color, gives a graphic picture of how Spicer transmissions and auxiliaries, torque converters, clutches, and other products are doing important service in the war effort by equipping trucks, tractors and other mobile units in Italy, Africa, the South Pacific, and on many other battle fronts. An interesting feature of the book is the reproduction of a letter from General, now Field Marshal, Montgomery to Major General Gatehouse, commenting very favorably on the fighting qualities of American equipment. The book also contains pictures of the Spicer plants and laboratories.

Copies of this brochure, "We Also Serve", may be secured by writing direct to the Spicer Mfg. Co., Toledo, Ohio.



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Often a good cutting torch prevents a costly shut-down of operations.

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HAULING JOB

MARION TRAILER DUMP

CUSTOM-DESIGNED TO MEET
INDIVIDUAL REQUIREMENTS

More efficiently - - - More economically

Highways are happy ways when you cart materials in this Marion Tandem Trailer Dump.

It has the capacity, fool-proof mechanism and durability to expedite over-the-road hauling and cut delivery costs.

The body illustrated is 24 feet long, with a capacity of 23 cubic yards. It is constructed of 10-gauge, high-resistance steel. The twin-cylinder telescopic hoist is capable of handling 22 tons of material.

Use MARION trailer dump bodies to handle all heavy, bulky materials. You'll find the name MARION a symbol of quality covering a complete line of light, medium and heavy-duty under-body hoists, single and twin-cylinder telescopic hoists and the Hydropaka refuse and garbage compressor body.

See Your Local Distributor or Write
THE
MARION METAL PRODUCTS CO.
BODY and HOIST DIVISION, MARION, O.

The West Meets East On the Burma Road

Native Labor and 8 Pieces Of Road Machinery Work To Link China's Man-Power And American Production

✦ THE 595.2 miles of the Burma Road comprise the foremost piece of strategic highway construction in the world today. Located in Yunnan Province, southwest China, it connects at Kunming with highways to Chungking and other Free China centers. At Wanting, only a few weeks ago under Japanese control, it connects with roads to railheads at Lashio and Rangoon and the Irrawaddy River port of Bhamo, all in Burma.

The reconstruction of this sole speedily feasible modern land route for heavy supplies from the United States destined for Free China was started in 1943, within the sound of battle on the Salween Front, by the Chinese government, with the advice and instructions of U. S. Army Engineers furnished by General (then Lt. General) Joseph W. Stilwell and assisted by Y-Force Operations Staff. Recently, the road provided support for the Salween campaign of the Chinese Expeditionary Force, clearing the enemy from a route west of the Salween River to connect the Burma Road with the Ledo Road from Assam, India. Within the past few weeks, it has been opened as a military highway for supplies from the United States to China, which has been virtually isolated since May, 1942, except for air transport.

The actual construction has been done by China's Yunnan-Burma Highway Engineering Administration (YBHEA) assisted, by orders of General Stilwell, then China-Burma-India Theater Commander, by a small hand-picked group of Americans, now called the Burma Road Engineers, and their predecessors, under control of Y-Force Operations Staff, America's large and unique military mission under Brigadier General Frank Dorn.

Service of Burma Road

The reopened Burma Road will: (1) add its volume of supply to vitalize China's war against the continental power of Japan; (2) both augment the present air supply to China and enable the U. S. Army Air Transport Command itself to fly greater quantities of military supplies over the "hump" from India to China; (3) permit moving into China equipment not practical for shipment by air; (4) improve the possibility of economic rehabilitation measures from within to permit China to become a modern military power; and (5) give more offensive supplies to Chinese armies buffing between the 14th U. S. Army Air Force and Japanese ground forces along the China coast.

Flying the hazardous India-to-China route, cargo planes have had to carry not only their cargo from India, but also sufficient gasoline for their return trip. Additional cargo in a quantity equal to the weight of the one-way supply of gasoline will be possible for the freight planes after the Burma Road gets into full operation.

Due to military necessity, unhandy cargo has at times been flown into China during the land-sea blockade period. Motor vehicles have had to be flown instead of driven in. Even road-building equipment, such as graders, has been dismantled, cut into pieces in India, and welded back together in China. This will not have to be done, once a military road connects India and China. And military and other equipment not possible to move by air can be moved by road.

U. S. Army Signal Corps Photo from British Combine
Chinese workers learned to use efficiently the three pneumatic drills available for the reconstruction of the Burma Road. The Chinese in the foreground wears a raincoat of palm fiber.

Reconstruction of the Burma Road is for military expediency. But the route is seen by some observers as holding possible broad long-range social significance in Asia. Following the proved methods of construction used, by the Chinese Republic, headed by Generalissimo Chiang Kai-shek, and U. S. Army advisors, in rehabilitating this road built over an old tea and spice route by Governor Lung Yun of Yunnan without original benefit of engineering, other hazardous pack trails from China may be widened into real highways under more favorable conditions. Asia, heretofore divided by nature, may become more closely knit along a pattern being set by the Burma Road.

If the British, after the war, permit the Burma Road to remain open, it may lead to the development of latent mineral, hydro-electric, manufacturing and other possibilities of Yunnan Province, one of the most undeveloped and isolated provinces of China. Its pre-war isolation was comparable to that of Mongolia and Sikiang. Since Japan

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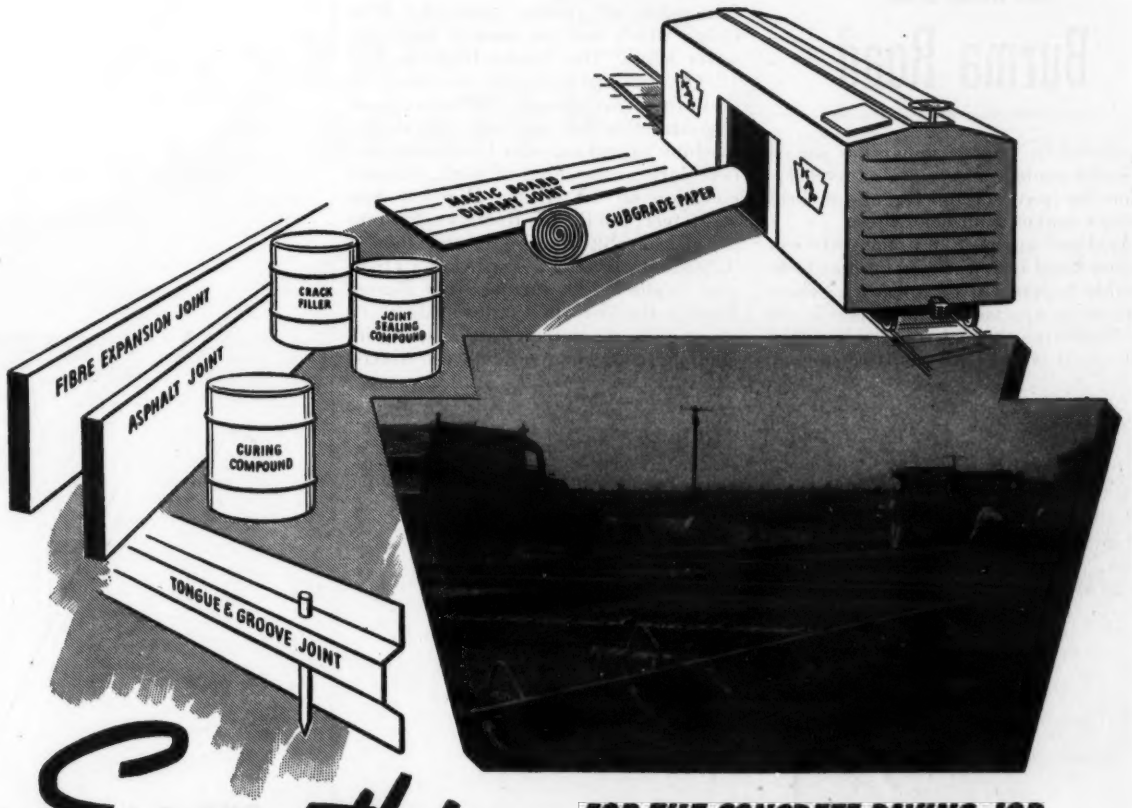

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Keystone Tongue and Groove Joint—used transversally and longitudinally gives maximum load efficiency. Distributes the load without cracking.

Keystone Asphalt Mastic Board Dummy Joints—for true, straight alignment without expensive installing machinery. Waterproof, rigid, easy to handle, low in cost.

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Other "Road Tested" Keystone Products—Joint Sealing Compound, Crack Fillers, Subgrade Papers, Sewer Pipe Joint Compounds, Fibre and Asphalt Expansion Joint, Waterproofings.

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PREMOLDED ASPHALT AND FIBRE EXPANSION JOINTS AND ACCESSORIES. JOINT SEALING COMPOUNDS AND CRACK FILLERS

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U. S. Army Photo from British Combine
Carrying a heavy timber in slings supported by poles on their shoulders, Chinese Engineer troops work to construct a bridge over the Mogaung River in north Burma. The project was part of the preparations for linking the Ledo and Burma Roads.

Burma Road

(Continued from preceding page)

blockaded the coast, Yunnan has gained in world contact and, via air travel, became the way station for all of Free China's contact with her Allies.

Another prospect for the post-war Burma Road is that it may become fashionable to travel it for pleasure. There is no more spectacular long road in the world flowing through such a beautiful setting. It is strictly a guess whether in the future accommodations will be made available to encourage pleasure-seeking tourist traffic; however, it is probable that for years only commercial traffic and the hardiest and bravest of adventurous travelers will view the glories of the new Burma Road.

Comparisons

The Chinese people of Yunnan Province, with their will, their hands, the "tzow tau" (a mattock-like shovel), and the bamboo basket, literally scratched and filled the original Burma Road for 595.2 miles, crossing the Kaoli Mountains, 12,000-foot spur of the Himalayas. And the U. S. Army's Burma Road Engineers, with but slightly more road equipment, have assisted the Chinese to reconstruct that world highway, at places crowding to within machine-gun range of enemy positions. Despite conditions, the reconstruction has been a record unapproached for virility, perseverance, and results.

The Alaska Highway had over 1,500 pieces of machinery, the Ledo Road had hundreds, but the Burma Road had eight, all of which were patched-up affairs taken off rusting junk piles in a China which had no modern land nor water inlets. The Alaska Highway had 12,000 workmen skilled in operating the best of new equipment; the Burma Road reconstruction had less than fifty skilled machine operators, who instructed Chinese during every hour of work. Highest elevation on the Alaska Highway was 4,212 feet; the Burma Road is eaten into a vertical cliff that high and tops a 9,200-foot elevation. The Alaska Highway bridges 200 streams; the Burma Road in the first 517.4 miles bridges 412 streams of more than 5-foot span, including the Mekong and Salween Rivers, and required 1,055 culverts. Alaska Highway workers had fair shelter and quarters; Burma Road builders, and much of the reconstruction labor, slept in the open on the mountainsides.

History

Despite contrary impressions, the Burma Road as such started from Kunming in 1920 along the general route of an old little-used caravan trail toward Burma. The road was opened by late 1939 to Wanting, Yunnan Province border village, to which place the governments of Burma had by then built roads to connect with their Irrawaddy River ports of Bhamo and Rangoon and with the railhead town of Lashio.

The course of the Burma Road was south of the more generally used pack trade routes of China, which reached India, Nepal, Afghanistan and other countries in that direction via Tibet. However, it was not a new route. A gate near the road about 398 miles from Kunming marks the reputed post for changing messengers along one of the communications routes established by Genghis Khan (1162-1227), Mongol conqueror who more nearly than any successor formed a United Asia and extended his domain south across the Himalayan barrier.

The walled village of Tengyueh (now Tengchung) was a Chinese "treaty port" in 1897, showing that along the general course of the Burma Road sufficient caravan trade then wended its way to justify customs collectors. It is reported that in 1938, one year before completion of the original Burma Road, customs officials at Tengyueh claimed annual collections of 100,000 rupees (about $35,000 at the 1944 exchange rate). The mule pack trip from Bhamo to Kunming, before opening the road in 1939, was 34 days.

At places a cobbled road 5 to 8 feet wide, made from weathered stones of possibly 1 cubic foot each, crosses or parallels the present Burma Road. Portions of this old Chinese road are estimated by a YBHEA engineer to be 2,000

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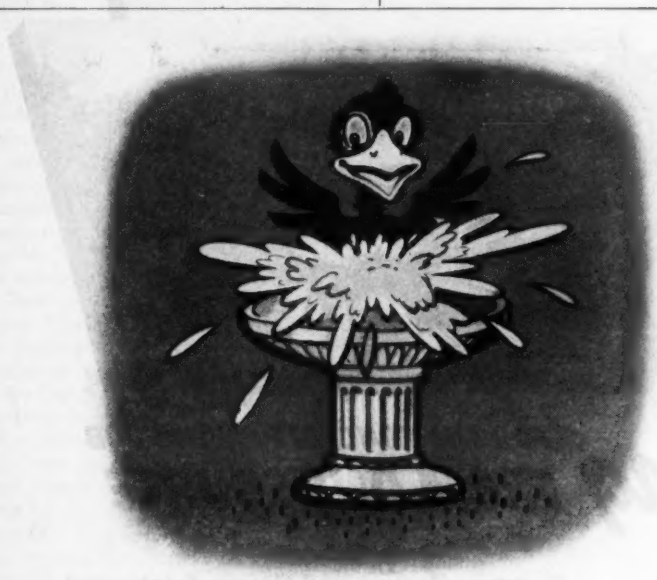

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Here is but one of many outstanding features of Insley design and construction that you'll want in your postwar dirt or rock moving and material handling equipment. Get the complete story now. Be among the first to specify an INSLEY Excavator when production for civilian needs is again resumed.

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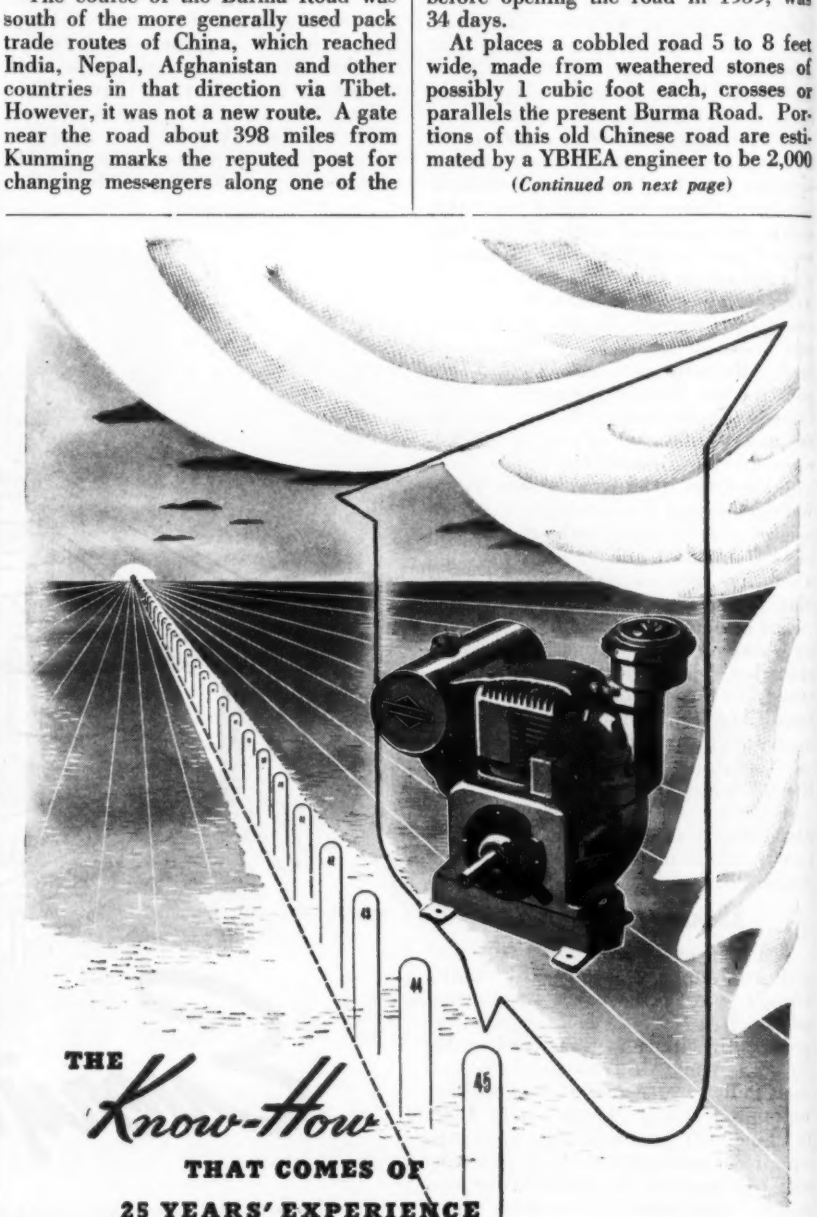

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This "know-how" is available to manufacturers of all types of appliances, tools and equipment, requiring dependable, compact gasoline power. The durability, easy-starting, and economical performance of Briggs & Stratton engines — plus dealer and consumer preference — make them "preferred power" everywhere.
BRIGGS & STRATTON CORP., Milwaukee 1, Wisconsin, U. S. A.

Burma Road

(Continued from preceding page)

years old. This old road even has steps on some of the sharp grades, showing that it was strictly a pack route and that wheeled vehicles were never anticipated by those who first paved it.

Building the first Burma Road, which started about 1920, was without engineering as we know it. It was done by coolies on the original concept that a road was anything a truck could drive over in dry weather. By May, 1942, when the Chinese made their defensive stand at the Salween River and blew up the bridge, the highway was 9.8 to 29.5 feet wide. Paving was 9.8 to 16.4 feet wide and consisted of a layer of 6-inch stone, placed by hand, covered with 2 inches of smaller stone as a wearing surface.

When Americans started cooperating with the Chinese National Government's Yunnan-Burma Highway Engineering Administration early in 1943, it was essentially a one-track all-weather road. The maximum gradient was 21 per cent. with numerous short grades of 6 to 50 feet exceeding this, while the approaches to all bridges exceeded this gradient. The minimum curve was 25 feet on the center line of the road. In mountainous and rocky sections the road was as narrow as 8 feet.

Financing and Labor

The allowance from the Chinese Central Government was $3,200,000 C.N. for the entire original construction of the Burma Road, averaging $3,400 C.N. per kilometer (0.62 mile). The average rise in the cost of living made the budget impractical if contracted laborers were being employed for all sections of the work. In order to cope with the situation, the Yunnan Provincial Government assigned the earth excavation, road surfacing, culverts of less than 5-foot span, and small temporary wooden bridges to the responsibility of each local administration, or hsien, to be done by conscripted labor so as to make up for the deficiency. All rock excavation, retaining walls, and bridges or culverts of more than 5-foot spans were done by the Provincial Government.

The total average mobilization of conscripted labor by the twenty-four districts or hsiens per day amounted to over 110,000. Work was completed between December, 1937, and May, 1938, with only temporary bridges, and 50,000 conscripted laborers were retained to do the improved work. The total amount of conscripted labor employed for the completion of the entire Burma Road was over 33,800,000 man-days. Nearly 80 per cent of the carpenters and masons available in Yunnan Province were called upon to do the work along various parts of the road, and about twenty Burmese technicians were called in for the completion of the Mekong River bridge. With 50,000 contracted laborers working day and night, the Road was opened to traffic in December, 1938.

Quantities and Costs

The work done by conscripted laborers included: earth for road bed, 15,696,000 cubic yards; 16-foot gravel road surface, 570 miles; and 1,055 culverts. The total compensation for the road surfacing was $651,897, and for the culvert work $75,443.

The work done by the Government was as follows: 269 bridges (excluding the Mekong and Salween bridges) totaled $743,657; 23 large culverts totaling $27,740; 118 temporary timber bridges totaling $50,927; rock excavation of 1,208,228 cubic yards totaling $1,070,336; special work, such as retaining walls, drainage, etc., totaling $26,220. The total expenditure, including the above-mentioned compensation to the various administrations, totaled $2,646,220. Explosives, traveling ex-

(Continued on page 47)

U. S. Army Signal Corps Photo

A Caterpillar D4 tractor and a LeTourneau Angledozer cutting a road out of a mountain side above the Salween River. Engineers of the U. S. Army's Y-Force Operations Staff supervised this work to reopen the Burma Road.

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HOISTS—DERRICKS
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Special Equipment
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STEAM HEATER

"Tankar" Steam Heater can be used to clean equipment.

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The "Tankar" Steam Heater is the fastest steam producing unit devised for the unloading of bituminous material from tank cars. This "Tankar" Steam Heater cuts the heating of tank cars by one-third.

Littleford "Tankar" Steam Heaters can also be used to clean construction equipment, motors, platforms, floors, also for stripping tanks.

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A new type of tractor seat for post-war road equipment has been developed by the Monroe Auto Equipment Co.

Easier Riding Seats For Trucks, Tractors

Greater comfort for operators of road building equipment means less fatigue. As the result of experience in designing and building more than 200,000 special seats for Army tanks, the Monroe Auto Equipment Co., Monroe, Mich., is planning to produce "after the war" a new seat for all types of road building equipment and particularly tractors. It is reported that these seats level off the ride of the occupant, regardless of the jolts taken by the chassis as it goes over rough ground. Not only does an easier-riding seat reduce fatigue, but it increases the safety of operation, as sudden bumps tend to reduce the driver's control over a vehicle unless he is protected from the shock.

The new seat utilizes a special variable-rate spring which reacts equally to large men or small boys. A double-action hydraulic shock absorber resists the down and up action of the spring, assuring a level ride. In addition, a stabilizer bar prevents side sway.

Complete information on this new seat for all types of road building equipment may be secured direct from the manufacturer by mentioning this illustrated news item.

Airport Development Awards Competition

The National Aeronautic Association has announced the rules for the Andrew J. Haire Airport Award for any ideas or achievements, large or small, which will contribute to the national development of airports. These awards for 1945, the creation of which was announced in December, 1944, are established especially to stimulate ingenuity and initiative right at the "grass roots".

Two general classifications have been made to guide those wishing to enter the competition. Under the first classification, Airport Development, are included planning, promotion, financing, construction, engineering, materials, and equipment; the second classification, Management, includes field operations, flight operations, field and building maintenance, financial operations, personnel management, service, community and customer relations, merchandising, advertising and publicity, and revenue-producing ideas.

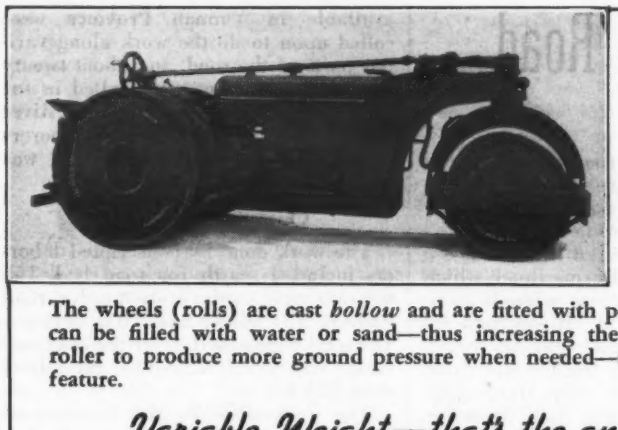
Any individual or organization, including members of the armed forces both here and overseas, is eligible for this competition, except civilian employees of the Federal government or employees of the Haire Publications, whose President is donor of the awards, and paid employees of the National Aeronautic Association. Awards will be made only for work entered into and completed between January 1 and September 1, 1945, and entries should be mailed to the National Aeronautic Association, 1025 Connecticut Ave., Washington 6, D.C., and be postmarked not later than September 1, 1945.

The awards include thirteen prizes, the first of $5,000, second of $1,000, third of $500, and ten of $100 each, in order to reach into all categories of airport or municipal personnel. Contractors and engineers who are engaged in any way in airport construction and maintenance are eligible for this competition. Full details may be secured by writing direct to the NAA.

Caterpillar Advances Two In Factory Manager Posts

C. A. Woodley, formerly Factory Manager of the Caterpillar Tractor Co., Peoria, Ill., has been advanced to Assistant General Factory Manager, and his former assistant, William Naumann, succeeds him as Factory Manager. Both men are graduates of the Caterpillar Apprentice School.

Mr. Woodley became a machine shop foreman in 1932, and progressed through various positions to the post of Factory Manager in 1942. Mr. Naumann first served as a gear technician in the Inspection Department, was appointed Superintendent of the machine shop in 1941, and a year later was advanced to Assistant Factory Manager.



What's *different* about this THREE-WHEEL ROLLER ?

The wheels (rolls) are cast *hollow* and are fitted with portholes so they can be filled with water or sand—thus increasing the weight of the roller to produce more ground pressure when needed—a very desirable feature.

Variable Weight—that's the answer!

Other important features are its *ruggedness*, its *easy steering*, its *clear vision*, and *operator-comfort*.

FOUR SIZES: 4-5 ton, 5-8 ton, 8-10 ton, 10-12 ton. WRITE FOR LITERATURE.

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J. E. INGRAM EQUIPMENT CO., 1146 W. Laurel St., San Antonio 6, Texas

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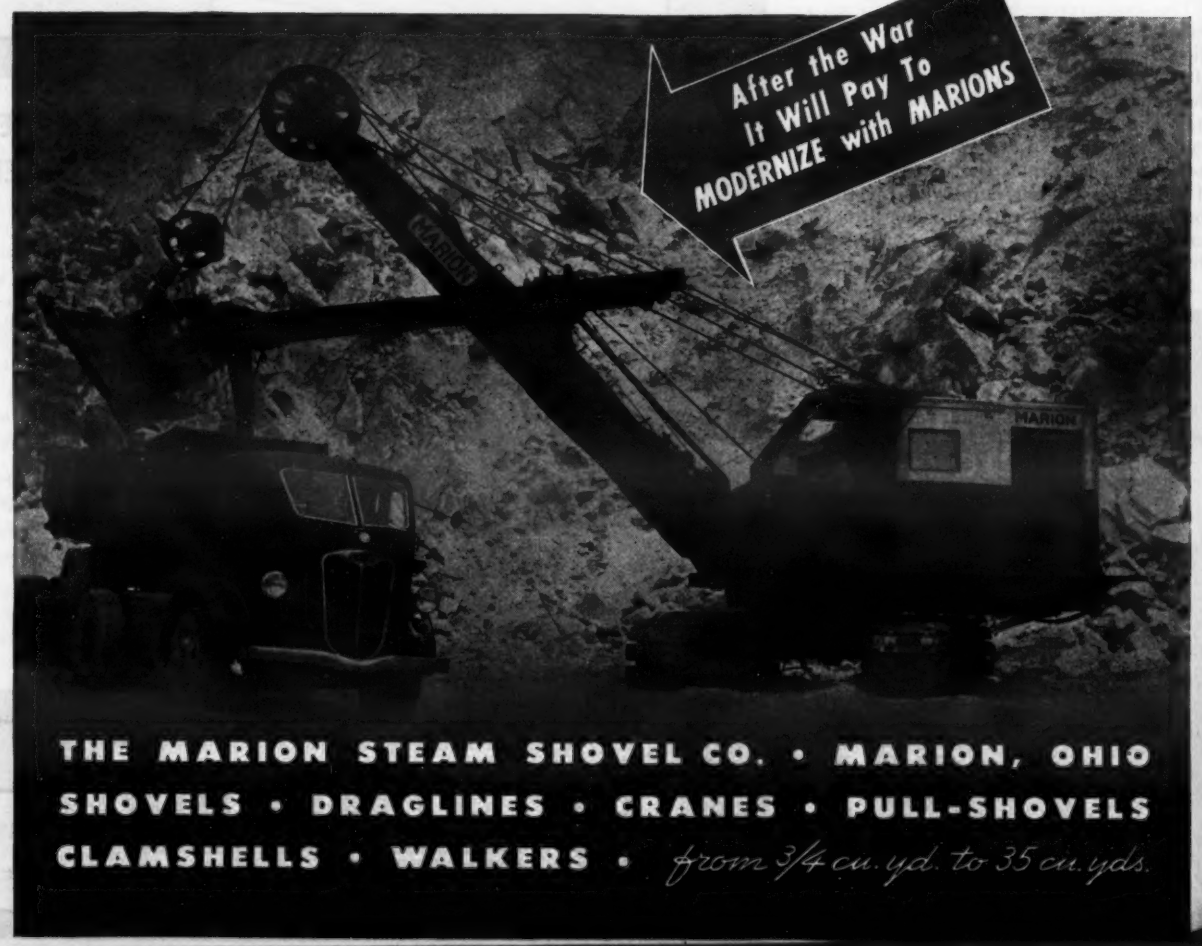
15 YEARS AGO we said:

"MARION is a real rock shovel".

MARIONS have stood the test of time and always will be the leader in rock or dirt digging.

What are your problems? Let's discuss them.



THE MARION STEAM SHOVEL CO. • MARION, OHIO
SHOVELS • DRAGLINES • CRANES • PULL-SHOVELS
CLAMSHELLS • WALKERS • from 3/4 cu. yd. to 35 cu. yds.

Runways Improved At N. M. Army Airfield

Surface Drainage Extended And New Plant-Mix Paving On Rigidly Controlled Base At Roswell, N. M., Field

✦ THE decision to reconstruct portions of the Army Airfield at Roswell, N. M., which was done by Ernest Loyd Construction Co. and The Skousen Construction Co. during 1943 and 1944, placed further emphasis on the fact that rigid control of materials and compaction methods is essential to best results. During the early emergency period of war construction, it was the well considered and logical decision of the authorities that speedy completion of adequate training facilities for our rapidly expanding Air Forces was of paramount importance and, when earlier completion could be attained by less rigid methods of control, it was right and proper to complete construction with the best available materials in the shortest possible time.

We are now in the second phase of airfield construction. The pressing need for new facilities has been met and the time has come for the improvement of existing facilities, and the correction of inadequacies in design or construction which, although they were recognized at the time, had to be permitted to speed completion. Heavier and faster airplanes have placed added requirements on our airfields, and this need has been met at Roswell by the recent construction program.

Old and New Design

As originally constructed immediately after Pearl Harbor was bombed, the Roswell Army Airfield consisted of two surfaced areas, one 2,400 feet wide and 6,000 feet long, and the other 2,400 feet wide and 5,400 feet long, joined with their longer axes at right angles. On this considerable area, 2 inches of hot plant-mix asphaltic concrete was placed on an 8-inch compacted gravel base over a subgrade compacted to 95 per cent standard Proctor density, and sealed with liquid asphalt. Inadequately constructed surface drainage and lack of maintenance of the seal coat permitted infiltration of surface water with resulting frost damage. This fact, combined with the presence of sections of base and subgrade which in the emergency desire for immediate completion were insufficiently compacted or improperly processed, and aggravated by the use of airplanes much heavier than those contemplated in the early design, caused rather extensive failures.

The revised design provided for the construction of seven runways varying in length from 5,655 to 7,330 feet, all 200 feet wide. Greatly improved surface drainage was installed and the stability of all courses, from subgrade to finished surface, was materially increased.

Improved Drainage

New runways were given a minimum crown of 1 foot or an equivalent transverse grade, and drainage depressions having side slopes of 1.5 per cent were constructed to discharge run-off through drop inlets into the existing storm-sewer system which was augmented by the construction of 3,000 feet of additional sewers.

Grading

Grading was sublet by the general contractor to L. J. Miles Construction Co., Fort Worth, Texas, which used 11 Caterpillar D7 and D8 tractors, some equipped with bulldozers; 3 Allis-Chalmers Model L tractors; an Allis-Chalmers Model WK; and an A-C Model S; an International 14; 2 LeTourneau rippers; 7 Model C and 3 Super C Tournapulls; a 12 and an 8-cubic-yard LeTourneau scraper; 2 1½-yard power shovels, a P & H and a Bucyrus-Erie; an elevating grader; and 30 dump trucks. The excavated material was spread, shaped, and compacted to 95 per cent modified Proctor density by these tractors, 4 Caterpillar motor graders, 2 Caterpillar blade graders, 20 double-drum sheepsfoot rollers, a pneumatic roller, and 2 10-ton 3-wheel rollers.

Water was secured from standpipes connected to the airfield water-supply system and was delivered by two 2,000-gallon and four 1,000-gallon tank trucks which sprinkled by gravity. Two shovel-mounted light plants and five portable plants furnished light for night operations. Two Lincoln and one Hobart arc welders and two oxy-acetylene welding and cutting torches aided in keeping the equipment moving, as did other shop tools available on the project.

Not the least difficult problem on this contract was the necessity for coordinating all construction operations with the needs of the Air Forces, as flying was not interrupted during the entire reconstruction period. The admirable spirit of cooperation shown by all parties did much to assure early completion.

"Here's an interesting article on why it's impossible to build a highway to Alaska."

Selected-Material and Base Courses

When the subgrade was satisfactorily compacted, a layer of selected material was placed, its thickness varying from 5 to 11 inches and its bearing ratio being not less than 30. This material was obtained from pits located just off the res-

(*Continued on next page*)

It's easier to lift, lower, push or pull the Simplex Way!

Simplex LEVER SCREW HYDRAULIC **Jacks**

for every construction purpose

Awarded the Gold Medal for Safety

Ask for Catalog 44

Templeton, Kenly & Co., Chicago 44, Ill.

Steam Hot Water or Heat

-- at Low Cost for every yard need

● Profitable, uninterrupted yard operation in cold weather calls for steam — hot water or heat — for many purposes.

- thawing and heating aggregate in stock piles or bins — for winter concreting.
- heating water for central mixing plants.
- heating asphalt, oils, bituminous material in tank cars or storage tanks.
- steam or hot water for cleaning machinery — heating offices and buildings.

Cleaver-Brooks automatic steam plants provide steam for every yard need — fast, dependably and at low cost. Where hot water is needed in quantity a Cleaver-Brooks hot-water booster fills the bill to perfection — provides 1600 gallons of hot water heated 150° F. per hour.

Write for bulletins and complete information on the entire line of Cleaver-Brooks equipment for cold weather construction and maintenance.

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Automatic Steam Plants

Completely self contained; highly efficient; require only simple piping connections to place in operation. Fully automatic fuel-oil burner; condensate recovery and feed water pumping system; no stack needed, sizes from 20 to 500 h.p.; pressures 15 to 200 lbs.

Hot Water Boosters

Oil-fired; fully automatic or manual operation; no licensed engineer needed; two capacity sizes: 3000 gals. storage tank for 1600 gals. of water heated 150° F. per hour; 1500 gals. storage tank for 800 gals. of water heated 150° F. per hour.

Portable Pumping Boosters

Heats bituminous material by direct firing in one operation, loading directly to distributor, relay truck or returning to tank car. Two sizes, truck mounting or 4-wheel trailer.

Portable Tank-Car Heaters

Available in 2 and 3 tank-car sizes. Oil-fired with exclusive four-pass flue travel; dry-coil steam condensate return under pressure — no water or heat loss. Provides a portable source of steam wherever needed.

Cleaver-Brooks

Pioneers and Originators of ★TANK CAR HEATERS ★BITUMINOUS BOOSTERS ★AUTOMATIC STEAM-PLANTS

Runways Improved At Army Airfield

(*Continued from preceding page*)

ervation and about 1½ miles from the point of use. A 1½-cubic-yard Bucyrus-Erie shovel, working from an average 16-foot face, loaded the selected material to a fleet of dump trucks, the number used and the resulting production varying with their availability. Dumped in windrows on the subgrade, the selected material was mixed by a Gardner mixer and spread and compacted by the same equipment used in subgrade processing.

On top of this was placed the base material, obtained from pits not far from those producing the selected material which comprises the lower layer. The addition of 10 per cent of Pecos River sand to the material in the pit reduced its liquid limit from 32 to 26 and increased its potential California bearing ratio from 80 to 95. This sand, which was loaded by a power shovel and hauled from the river about 16 miles away, was dumped in proper proportions around the top of the pit, after bulldozers had removed the sod and light overburden. In loading the pit material, the two Lorain shovels, a 77 and a 75-B, obtained preliminary mixing of the river sand. This mixing was improved during passage through two Pioneer crushing plants. Processing in this manner produced a base material meeting the following specifications:

Passing a 2-inch screen	100 per cent
Passing a No. 4 screen	30 to 60 per cent
Passing a No. 40 screen	15 to 35 per cent
Passing a No. 200 screen	5 to 15 per cent
Liquid limit, not more than	30
Plasticity index, not more than	10
California bearing ratio, not less than	80

This material was spread in two layers of 5-inch loose thickness and compacted to a finished thickness of 7 inches, the wetting, shaping, and rolling being done by the equipment previously used on subgrade and selected material. Both courses of the base were carefully checked for grade and surface, hand-finishing being performed if necessary, and no section of the lower layer was covered by the succeeding course until it was at, or below, optimum moisture content. Production and placing of base material proceeded at an average rate of 2,500 cubic yards per 10-hour working day. The haul from the crushers averaged 2 miles, and from 20 to 30 trucks carried the 4-cubic-yard loads.

Field Control

Complete field-laboratory control was obtained on this project. A well equipped and adequately staffed field laboratory was available and careful and continuous watch was maintained to assure specified grading, soil constants, acceptable processing, and moisture control and compaction in accordance with the best practice. Optimum moisture varied between 9 and 12 per cent and it was found that loading the sheepsfoot rollers to between 650 and 700 pounds per square inch provided the most effective and economical compaction.

The Hot-Mix Plant

Mixing and laying of the 2-inch asphaltic-concrete surface was performed under a subcontract by R. W. Briggs & Co., of San Antonio, Texas, from its Madsen asphalt plant erected on the reservation, with an average haul of less than a mile.

Aggregates from the Roswell plant of F. M. Reeves & Son were hauled in 4 and 5-cubic-yard loads in Ford and Chevrolet trucks and dumped in four stockpiles located in a three-quarter circle behind the primary feed bin. This was a 4-compartment 55-cubic-yard Madsen steel bin set low enough so that the operator of the P & H crane with a 60-foot boom could see into its top, and reach any of the four compartments from any of the four stockpiles without any crane travel whatever. A Caterpillar D7 tractor with a LaPlant-Choate bulldozer kept the stockpiles properly cleaned up and within reach of the crane at all times.

In a tunnel under this bin, the discharge gates from each of its four compartments could be adjusted to deliver properly proportioned aggregates to a 24-inch conveyor belt. A General Electric 50-hp motor drove this conveyor belt as well as the oil-fired rotary drier into which it fed the cold aggregates. Careful control was exercised on the cold-material feed, thus eliminating overloading of the hot screens and bins and resulting in excellent production of an asphaltic concrete complying with the following grading specifications:

Passing a 1-inch screen	100 per cent
Passing a ¾-inch screen	85 to 100 per cent
Passing a ½-inch screen	73 to 93 per cent
Passing a No. 4 screen	46 to 75 per cent
Passing a No. 10 screen	32 to 63 per cent
Passing a No. 40 screen	16 to 37 per cent
Passing a No. 80 screen	10 to 24 per cent
Passing a No. 200 screen	4 to 9 per cent
Asphaltic cement	5 to 7½ per cent

At the top of the hot elevator a 4 x 8-foot Symons vibratory screen having 1-inch, ⅝-inch, ⅜-inch, and No. 10 sections rejected the oversize and separated the hot aggregates into four sizes for proper weight proportioning. The hot elevator, shaker screen, and pugmill were powered by a 200-hp General Electric motor.

Because of the uncertainty of asphalt deliveries, a steel storage tank for 45,000 gallons of asphalt was provided by the contractor at the plant site and replenished by trucks hauling from railroad cars shipped to a nearby siding from the Col-Tex refinery at Colorado City, Texas.

The pugmill accommodated a batch of 4,000 pounds, and two batches constituted a load for the Ford and Chevrolet trucks used to haul the asphaltic concrete. The number of trucks varied with the length of the haul but averaged twelve, and enough were used to eliminate delays from that cause. Another

(*Continued on page 55*)

When the War Ends—

We will re-solicit your orders to make rapid, large-scale Aerial Surveys of

Highways, rivers, railroads, rights of ways, etc.

Until then we are engaged wholly on work for the Government.

CHICAGO AERIAL SURVEY COMPANY

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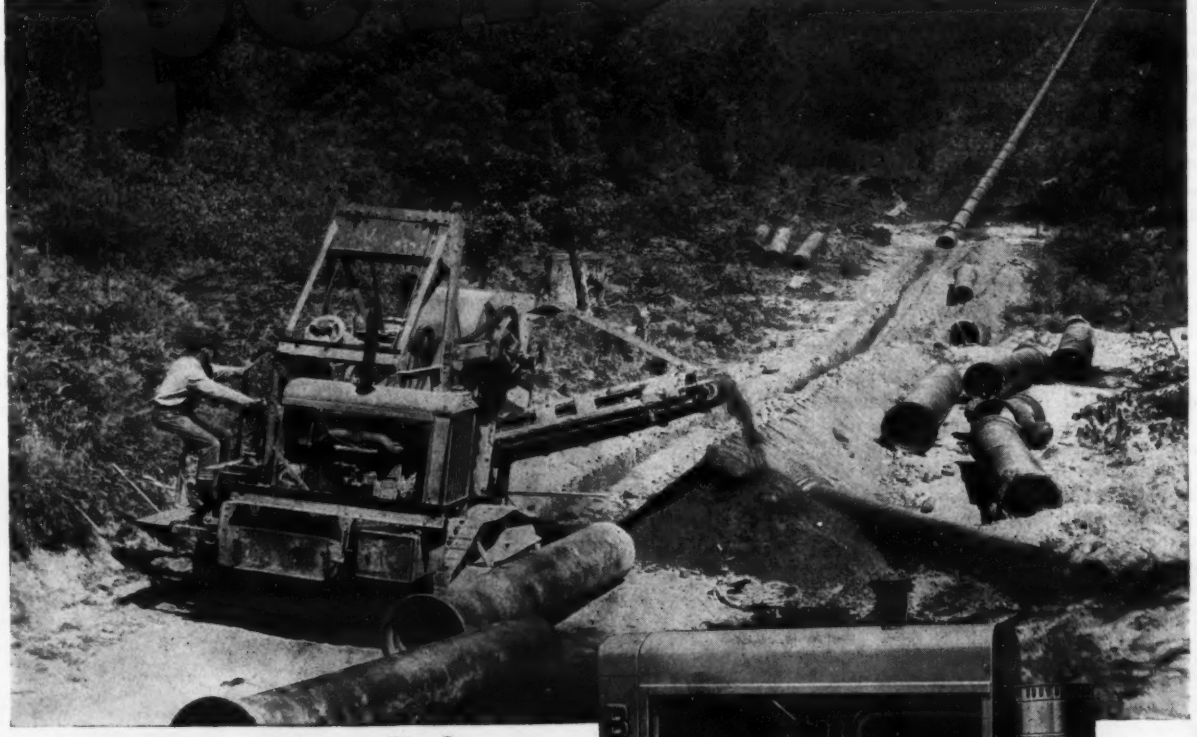
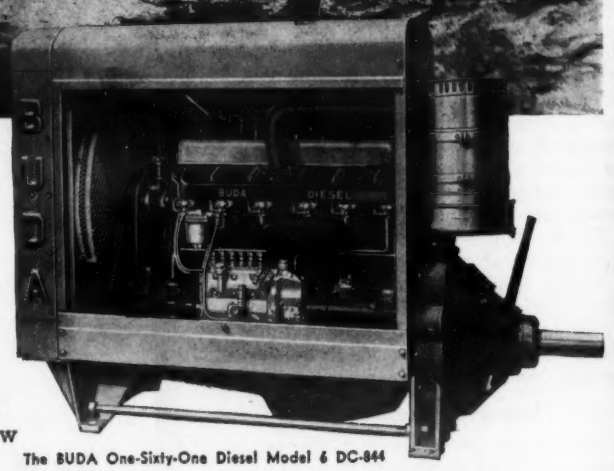


power... for ditching



The BUDA One-Sixty-One Diesel Model 6 DC-844

• The demand for "tomorrow's engine today" calls for greater power per size of unit.

There are different ways of increasing the power of an engine—by speeding it up, by increasing combustion pressures . . . but BUDA achieves this goal through *greater piston displacement* with no greater weight or size. Longer life is assured through the low pressure Lanova combustion principle.

This, like all BUDA improvements, is born of long and wide experience — through 64 successful years of making better equipment to do a better job.

BUDA engines are now available for essential industries. Write or wire today for complete details.

More Horsepower Per Pound and Per Inch!

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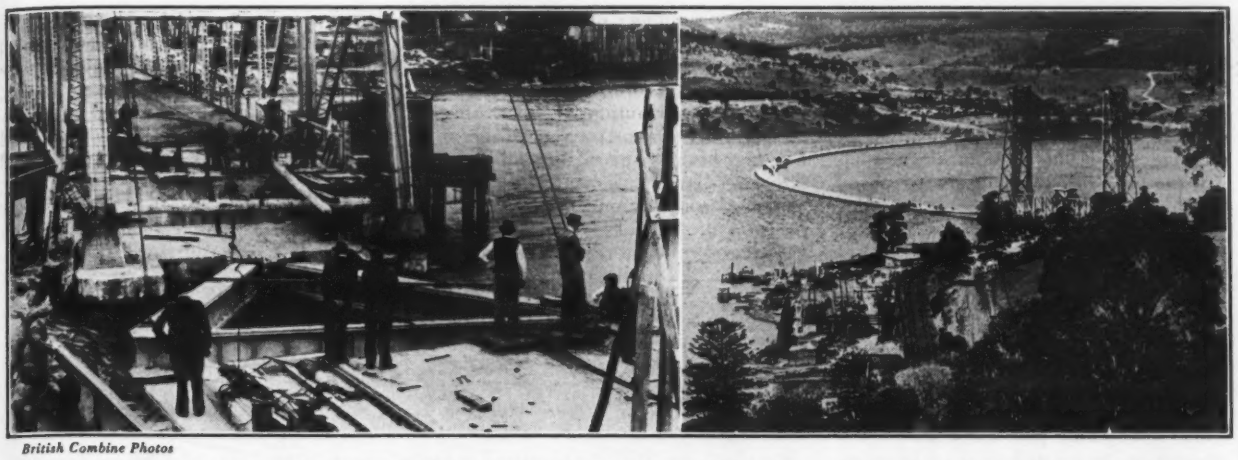

British Combine Photos

Joining the floating section of the Hobart Bridge to the fixed span, showing the massive steel girders which form the link between the floating and fixed parts of the bridge. At right, the completed structure, which is a floating arch bridge over the Derwent River in Australia.

Floating Arch Bridge An Unusual Structure

An interesting bridge, which is a combination pontoon and lift-span structure, has recently been built over the Derwent River in Australia. Designed by David Victor Isaacs in consultation with the Tasmanian Public Works Department, the floating portion of the bridge consists of twenty-four pontoons, 132 feet long and each weighing 1,000 tons, of hollow reinforced-concrete construction but divided by partitions to act as strengtheners. These pontoons were built on the shore, then launched one by one, floated to sheltered waters in Geilston Bay, and there joined by welding together the hundreds of steel reinforcing rods embedded in their walls, to form the 3,165-foot-long curved floating section.

Passage of shipping is permitted by a 204-foot lift span which is raised electrically to a height of 180 feet in two minutes, giving ample clearance for average-size modern ships. The lift towers appear in the right foreground of the right-hand photo in the accompanying illustration.

The roadway across the arch is 30 feet wide, with a 6-foot pathway for pedestrians.

Extra-Strength Clay Pipe Now Covered by ASTM Spex

In a report to the directors of the National Clay Pipe Manufacturers, Inc., who met in Chicago January 8-9, H. C. Maurer, President, emphasized the 1944 developments in the relations of clay-pipe manufacturers with the engineers who specify and use their products. An important fact brought out by Mr. Maurer is that the American Society for Testing Materials now includes in its standards specifications for extra-strength vitrified-clay pipe.

These new specifications are distinct from former specifications for conventional vitrified-clay pipe, which also were improved last year. There are now two standards of ASTM applying to clay pipe: one, for extra-strength clay pipe under the designation C-200-44-T; and the other for clay sewer pipe under the designation C-13-44-T. The new specifications for extra-strength pipe, while not entirely identical in language with U. S. specification SS-P-361-A, nevertheless describe the same materials and accomplish the same purpose as the Federal specifications. This product is also included in the standard specifications of the American Railway Engineers Association.

Extra-strength pipe is approximately twice as strong as conventional sewer pipe and can be used in many instances where cradling and casement or other supplementary strength provisions are necessary to resist both live and dead loads.

CUMMER
ASPHALT PLANTS
EIGHT SIZES
Up to 1000 Tons per day
DRYERS
Two-Fire and Internal Fire
30 to 100 Tons per hour
Electric Batch Timers
50 Years' Experience
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Some machines, of necessity, are designed with critical diameter sheaves. And many of these machines are put to rough-going. It is on such jobs that American Cable TRU-LAY PREFORMED really shows its superiority. Thanks to the preforming process, TRU-LAY can take the torture of small sheaves—resists squirming or rotating in the grooves. The preforming process also makes TRU-LAY resist kinking or snarling; broken outer wires lie flat and in place, thus making it safer and easier to handle. For your next wire rope, specify American Cable TRU-LAY PREFORMED.

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AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE • BRIDGEPORT
TRADE MARK
In Business for Your Safety

Bureau of Reclamation Photo

This model in the Bureau of Reclamation's hydraulic laboratory in Denver was used to study the delta region of the Sacramento and San Joaquin Rivers in California, and aided in the final selection of the route of the Delta Cross Channel.

Model Aids Selection Of Channel Location

The final location of the Delta Cross Channel of the Central Valley Project in California, which will transfer irrigation water from the Sacramento to the San Joaquin Valley, has been announced by the Regional Office of the Bureau of Reclamation in California. The route of the channel across the Sacramento-San Joaquin Delta, selected after exhaustive studies both in the field and by means of extensive model tests in the Bureau's hydraulic laboratory in Denver, follows in general the plan recommended by State Engineer Edward Hyatt, and later approved by the Legislature and the people of California in the special election of 1933.

To determine the practicability of this natural channel route, the least expensive of the various proposed plans, the hydraulic laboratory at Denver built a scale model replica of the entire Delta in order to make a more detailed study of the problems involved. In connection with the model, a machine, capable of reproducing any tide on record in Suisan Bay and the Delta channels, was built to permit study of the effects and currents of salt-water invasion of Delta channels under variable conditions likely to occur in the future. By operating the model, Bureau engineers were able to study both salt-water intrusions and also the pathways of Sacramento and San Joaquin river water en route to the sea through the maze of Delta channels. In this manner, the studies determined the practicability of the original State plan for repelling salt water and for delivering water of the required quality to the Delta-Mendota Canal intake.

Under this plan, Sacramento River water, made available by storage behind Shasta Dam, will be diverted into the Mokelumne River through an enlargement of Snodgrass Slough. Thence the water will be introduced into the Delta through the two main forks of the Mokelumne River. Finally the water will reach the intake of the Delta-Mendota Canal near Tracy by being drawn through the existing channels in the southern portion of the Delta, the main flow being through Old and Middle Rivers of the San Joaquin. Through the Delta-Mendota Canal it will be carried to Mendota Pool some 110 miles south, and turned into the San Joaquin River in exchange for the cropland water stored at Friant Dam and delivered into the Madera and Friant-Kern Canals.

The construction necessary to make the water available to the Delta-Mendota Canal through the Delta Cross Channel includes a pumping plant at the head of Snodgrass Slough with an ultimate capacity of about 10,000 second-feet. Of this quantity of water, 4,600 cubic feet per second will be required for the Delta-Mendota Canal when operating at maximum capacity, and the remaining water will enter the various channels to form a fresh-water barrier against salt-water intrusion and for consumptive use in the Delta and on adjoining lands. To carry out this plan, the Snodgrass Slough Channel would be enlarged to carry 10,000 second-feet, and dredging and related work would be necessary to enlarge a portion of Old River.

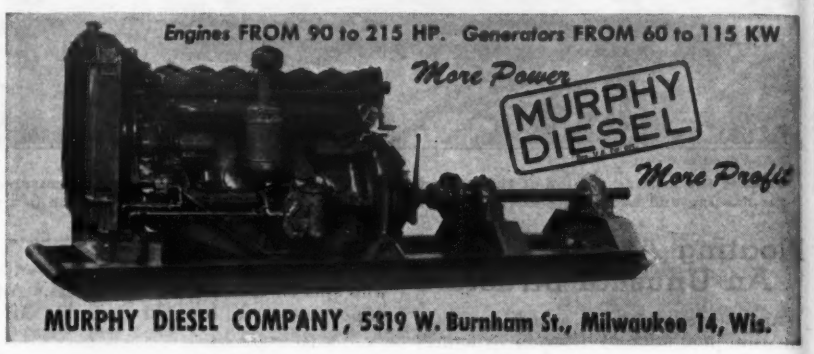
According to Bureau of Reclamation officials, this decision as to method of crossing the Delta by natural channels will permit work on plans to go ahead for this vital link in the Central Valley Project.

Advisory Commission Reports on Conn. Roads

The Connecticut General Assembly in 1943 authorized the establishment of an Advisory Highway Commission to study and advise with the Highway Commissioner concerning post-war highway improvement, the distribution of highway funds to cities and towns, and various other problems connected with the development and administration of the highway system of Connecticut. This Commission, which was appointed on July 28, 1943, has made its first report.

The information covered in this report includes a summary of the Commission's findings, its conclusions and recommendations on the subjects of highway use, highway safety, future demands for highways, the distribution of town aid, finance and the construction program, a five-year highway program, and its legislative recommendations. The latter include a constitutional amendment to prohibit the use of gas-tax and motor-vehicle revenues for non-highway purposes, a revision of the trunk-line system, and a number of other acts which the Commission believes would increase the efficiency of the state highway system.

Highway officials interested in studying this report on the Connecticut road system, its present status, needs, and future development, may secure copies, gratis, by writing direct to the Highway Commissioner, Connecticut State Highway Department, Hartford, Conn.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More Power
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More Profit
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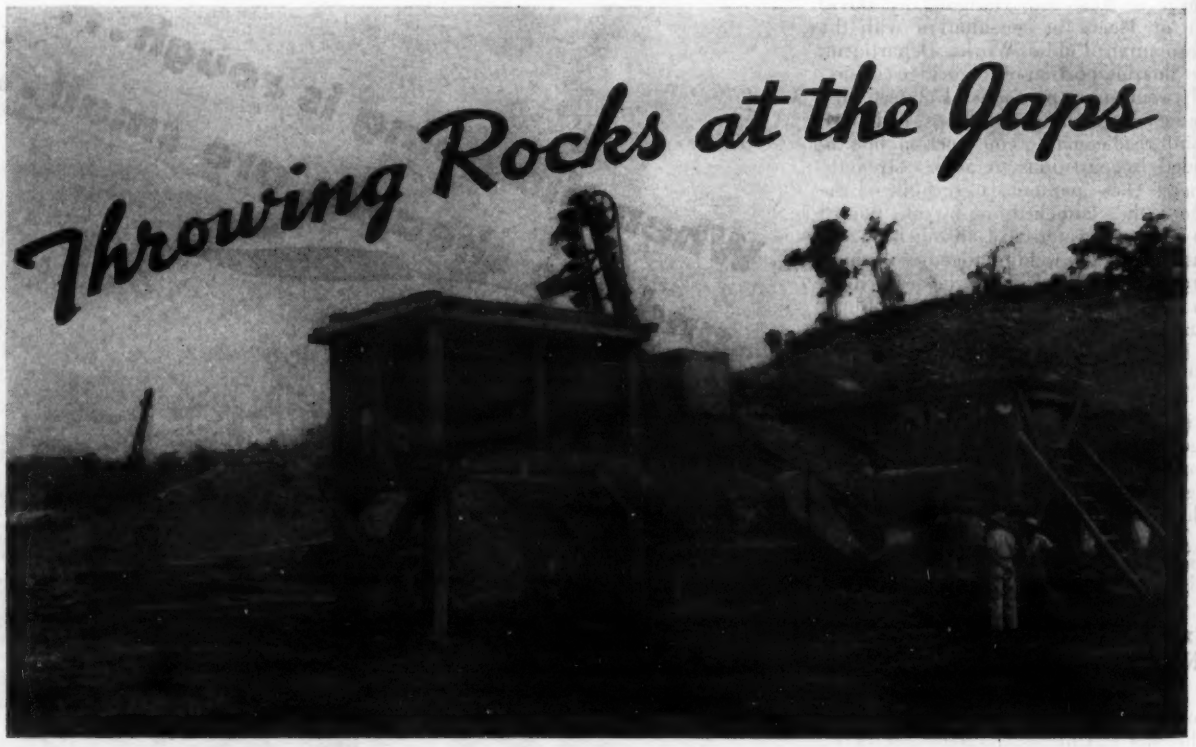
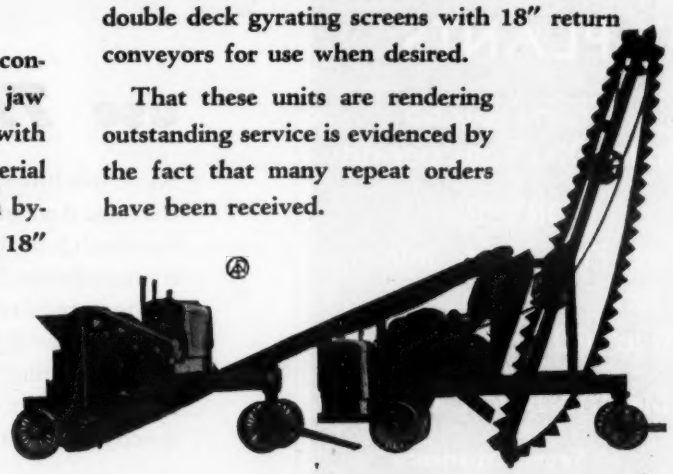


As fast as the Japs are pushed back from South Pacific Islands, air bases are established. Knowing there would be need for a single, highly mobile rock crushing plant, Universal engineers — early in the war — designed such a plant. Scores of them are in use from Australia to almost the gates of Tokyo.

Designated our No. 522-Q, these plants consist of a 20" x 36" Series "SL" primary jaw crusher mounted on a steel-wheeled truck with power unit and conveyor. Crushed material from the primary is fed to a grizzly with by-pass placed over the truck-mounted 30" x 18" secondary roll crusher, oversize chuting to the roll crusher and throughs going to a bucket elevator boot. Elevator discharges into bin made of native materials to load trucks for hauling to landing strips under construction.

All the plants are provided with 3' x 8' double deck gyrating screens with 18" return conveyors for use when desired.

That these units are rendering outstanding service is evidenced by the fact that many repeat orders have been received.



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More Ford trucks on the road

On more jobs

For more good reasons !

TRUCK-ENGINEERED

FORD TRUCKS
AND COMMERCIAL CARS

TRUCK-ENGINEERED AND TRUCK-BUILT BY TRUCK MEN

Alameda County

(*Continued from page 6*)

span at Park Street and a 2-lane 200-foot span at High Street. Both bridges have a 15-foot clearance above high tide but, since the estuary is in constant use by large seagoing vessels, the number of which has greatly increased during the war, their use is an item of considerable expense to the County. Since the estuary which they cross is the corporation line between the two cities, it was considered necessary that the County maintain the bridges and tunnel even though their traffic is primarily urban and industrial.

The Posey Tube, built in 1925, constitutes an even larger item of expense. It is 3,545 feet long between the portals, and the depressed open roadway at each end increases the total restricted length to 4,436 feet. The roadway has a clear width of 22 feet 11 inches with two 3½-foot-wide pedestrian walkways, one on each side, and is built with 4½ per cent grades at its ends with a level center section. Connecting Harrison Street in Oakland with Webster Street in Alameda, the tunnel carries 25,000 vehicles per day between the two cities, with a rate of 2,600 per hour during peak periods. With this volume of two-way traffic in a tunnel so narrow as to provide but two lanes, delays and accidents are inevitable and the policing of the tube alone calls for the services of two patrolmen at all times.

Ventilation is provided by sixteen fans with a total capacity of 1,000,000 cubic feet per minute. The fans are located in two blower houses at the portals, four exhaust fans and four blowers being installed in each house, each separately powered by 40-hp electric motors. Fresh air is blown into the tunnel through openings in the curbs leading from large air ducts under the roadway. Exhaust air is drawn through openings in the ceiling into overhead air ducts which discharge at each portal building. Detectors in the air ducts indicate the amount of carbon monoxide present at all times on dials visible to the fan operators, who regulate the fan speed so as to keep the deadly gas at 1.8 parts per 10,000, never allowing it to exceed 2 parts. Under the heaviest traffic encountered to date, this has been accomplished with not more than 75 per cent of the installed fan capacity which is theoretically capable of completely changing the air in the tunnel forty times per hour.

County Yards and Shops

The administrative offices of Alameda County are housed in the County Courthouse in downtown Oakland with the drafting room and accounting department. Two storage yards are located at Hayward and Livermore, providing fueling facilities and safe storage for equipment working in nearby areas.

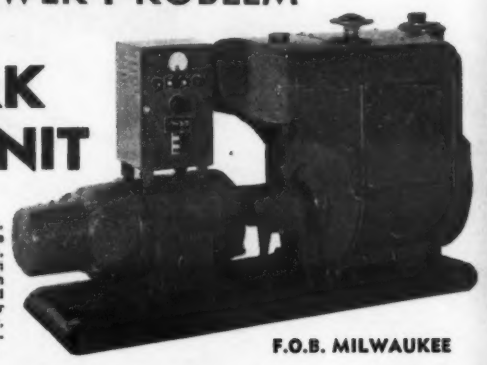
The yard at Hayward, typical of both, consists of an area of approximately one acre, paved with armor coat on a gravel base and surrounded by a wire-mesh fence. A corrugated sheet-metal building with timber framing provides a covered storage area 30 feet wide and 150 feet long, open on the south side only and divided into stalls by the supporting posts. At the east end are boxed-in tool lockers while the 40 feet at the west end of the building is entirely enclosed, access being through four sliding doors in the south wall, and is used for more protected storage or for performing minor repairs. A 12 x 12-foot space in the extreme northwest corner provides a heated office. In this room a large blackboard shows the location of all the crews working out of that district yard on any one day. A detached sheet-iron building nearby houses oils and greases in its 12 x 30-foot interior while a canopy in front protects the gasoline dispensing pump. A man is on duty 24 hours of every day to dispense fuel or to answer emergency telephone calls and relay the information to the proper authority.

The central repair shops at Niles include about five acres under fence with most of the area between buildings surfaced. The southern part of the area, used for open storage of lumber, posts, concrete and corrugated-metal pipe, and similar bulky materials, was formerly an apricot orchard. Storage is arranged to protect the still bearing trees which are cut only when it is unavoidable, and it is rumored that the Niles shop is most popular among the traveling members of the County highway forces during the season when the apricots are ripe, at which time most of them find very urgent business to transact there.

The six main buildings are arranged in two rows of three each from north to south, with the main entrance at the north end between the two rows. The first building on the left is the machine shop. Built of corrugated sheet metal on a wooden frame, this building is 45 x 132 feet in size, well lighted by win-

(*Continued on next page*)

—SOLVED—
A POWER-PROBLEM
WITH
A CLARK
POWER UNIT



SPECIFICATIONS
Pictured is a 7½ KW, 3 phase, 60 cycle, 120/208 volt, 1800 RPM gasoline engine driven generator set, 4 cylinder, 4 cycle, 3¼" bore, 3¼" stroke, 107.7 cu. in. piston displacement. Engine and generator both mounted on a structural steel switchboard containing an AC voltmeter, generator voltage regulator, exciter field rheostat, and air circuit breaker. Available for immediate shipment from Milwaukee stock.

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CLARK SUPPLY CO.
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Fewer WALTER SNOW FIGHTERS
Do a FASTER, CLEANER Job!

The great volume of snow removed per hour by Walter Snow Fighters enables them to effectively clear more miles of highway per day than conventional rear-wheel and four-wheel drive trucks. These specialized units clear important roads sooner after the heaviest blizzard—gain you extra time for opening secondary roads.

Positive traction, which fully utilizes tremendous motor power, is the unique Walter feature which makes this performance possible. In the exclusive Walter Four-Point Positive Drive, three automatic locking differentials proportion power to FOUR driving wheels according to their traction at any instant. Full horsepower is utilized in driving Walter Snow Fighters on snow and slippery surfaces—none is wasted on wheel-spinning, slipping and stalling, common failings of other drive units.

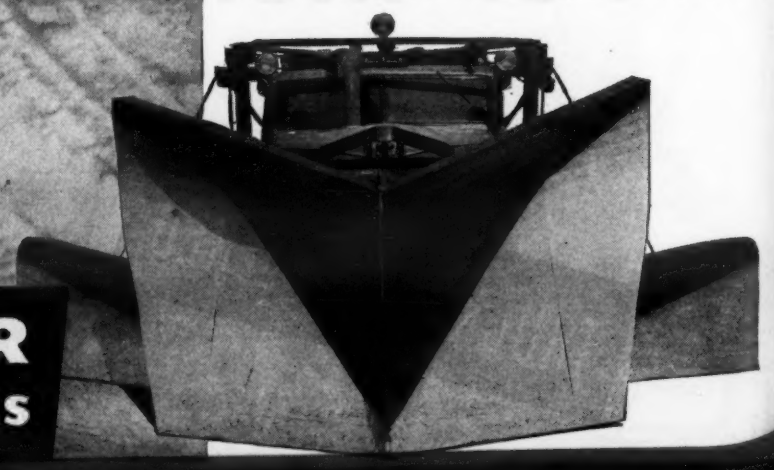
In battling the heavy blizzards of this severe winter, Walter Snow Fighters have again proved their superiority on American and Canadian highways.

FASTER—*The 250 h.p. Walter Snow Fighter reaches plowing speeds as high as 30 m.p.h.—speeding up all phases of snow removal from drift-busting to widening-out.*

CLEANER—*It clears a 28 ft. width in one run, a two-lane road in one round trip. Hydraulically-controlled center scraper attachment cleans hard-packed snow and ice to pavement.*

SAFER—*Snow is removed before it packs and freezes into dangerous ruts.*

WALTER MOTOR TRUCK CO., 1001-19 Irving Ave., Ridgewood 27, Queens, L.I., N.Y.



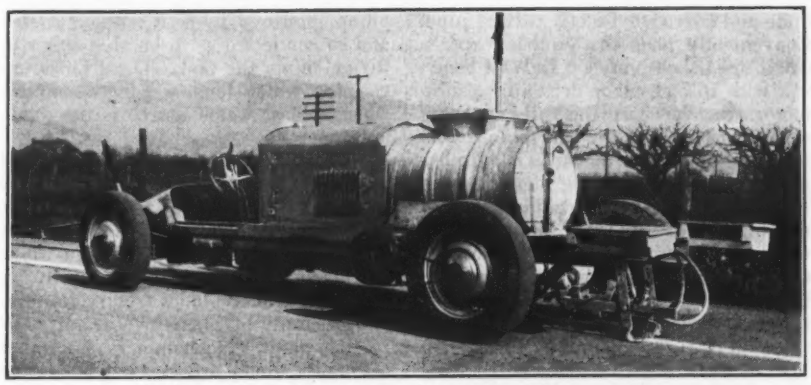
WALTER
SNOW FIGHTERS

Alameda County

(*Continued from preceding page*)

dows over the work bench along the east side and by skylights which provide additional ventilation. The north 15 feet of the building is boxed off from the large open shop to provide office space for the County Equipment Superintendent, and lockered storage for special tools, carburetors, fuel pumps, distributors, and other things which might be needed for emergency repairs. Upstairs is a salvage room in which are stored used and damaged bushings, bearings, gears, and similar items which might have been scrapped before the war, but which are now carefully saved, checked at frequent intervals by the Shop Superintendent so that he retains a mental picture of what is available, and frequently found useful in unexpected ways and unpredictable places for repairs or assembly of equipment. A Black & Decker valve-seat facer on a rolling stand and electrical testing equipment are also stored in the north-end rooms. In the Superintendent's office a blackboard, similar to the one at Hayward, but larger, is posted each morning by the dispatcher to show the location of each piece of equipment in the county. He also phones the information to the downtown office in Oakland.

Seven 12-foot sliding doors through the west wall give access to the machine shop proper which has a concrete floor, except for the area immediately along the front of the work bench against the east wall and the area in the south end of the building utilized for the blacksmith shop. In these two areas, wooden flooring provides additional comfort for the mechanics. A U-shaped grease pit occupies much of the area in front of the sliding doors but is covered by 3 x 12-inch plank, cut to fit across it flush with the concrete floor, when not being used. The two legs of the U are towards the two end doors so that trucks entering through them can straddle the grease pit, giving the greaser access to their entire length from below. Between the uprights, shorter trucks drive across the 5-foot width of the pit on the cover planks, stopping with the front wheels on one side and back wheels on the other, after which the planks are removed and the lubrication performed. By this arrangement several trucks can be serviced simultaneously from the grease pit.



Another view of Alameda County's traffic-striping machine.

To the 12 x 12-inch posts supporting the walls and roof of the building ¾-inch steel plates are bolted 16 feet above the floor and extended towards the center of the building far enough to support 14-inch I-beams running parallel to its longer dimension. These I-beams form the tracks of a Judson Pacific crane of 5-ton capacity which can serve the entire shop area.

On the work bench under the east-wall windows are a G-E battery charger, a 9-inch x 36-inch South Bend lathe, a Sioux valve facer, a ¾-inch heavy-duty Black & Decker electric bench drill, and a Black & Decker bench grinder with 6-inch-diameter wheels. A ¼-inch Black & Decker hand drill was also plugged into a socket above this bench and was in use on a truck parked over the grease pit at the time of our visit. Beyond the work bench is a Monarch lathe with an 8-foot bed and 20-inch swing. A Canedy-Otto 20-inch drill press, and a 60-ton Manley hydraulic press are in the interior of the shop near the south end. A Marvel power hack saw is mounted on casters for convenient movement about the shop and equipped with its own electric motor and an extension cord. In conjunction with this is used a 2-foot-high rolling stand, built of ⅝-inch pipe with a top area of 12 x 18 inches, for supporting the work.

In the extreme south end of the building is the blacksmith shop. Here the blacksmith was making bits for the bridge crew's core drill, among other items, using a Buffalo forge, equipped with a hood and a 14-inch induced-draft fan to carry the smoke away through a stack on the outside of the building,

(*Continued on next page*)

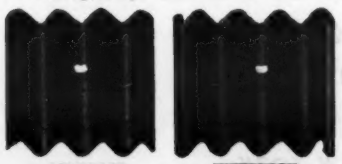
Designed for the Job!

CORRUGATED STEEL SHEET PILING

If your job demands piling that is economical . . . durable . . . and easily transported . . . then Corrugated Steel Sheet Piling is the answer. It has been unusually effective when used for sewers, sewage disposal plants, coffer dams, bridges, bulkheads, and like purposes.

Corrugated is a strong but lightweight piling that is easily handled and pulled—eliminating transportation headaches by *saving time, space, and labor costs.* Cold rolled from open hearth steel, Corrugated is so durable it lasts for years . . . may be used again and again . . . distributing the initial cost over many jobs.

Corrugated Steel Sheet Piling comes in two types—standard and interlock. Specify one to meet your requirements. Write for catalog today.



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CAINE STEEL CO.

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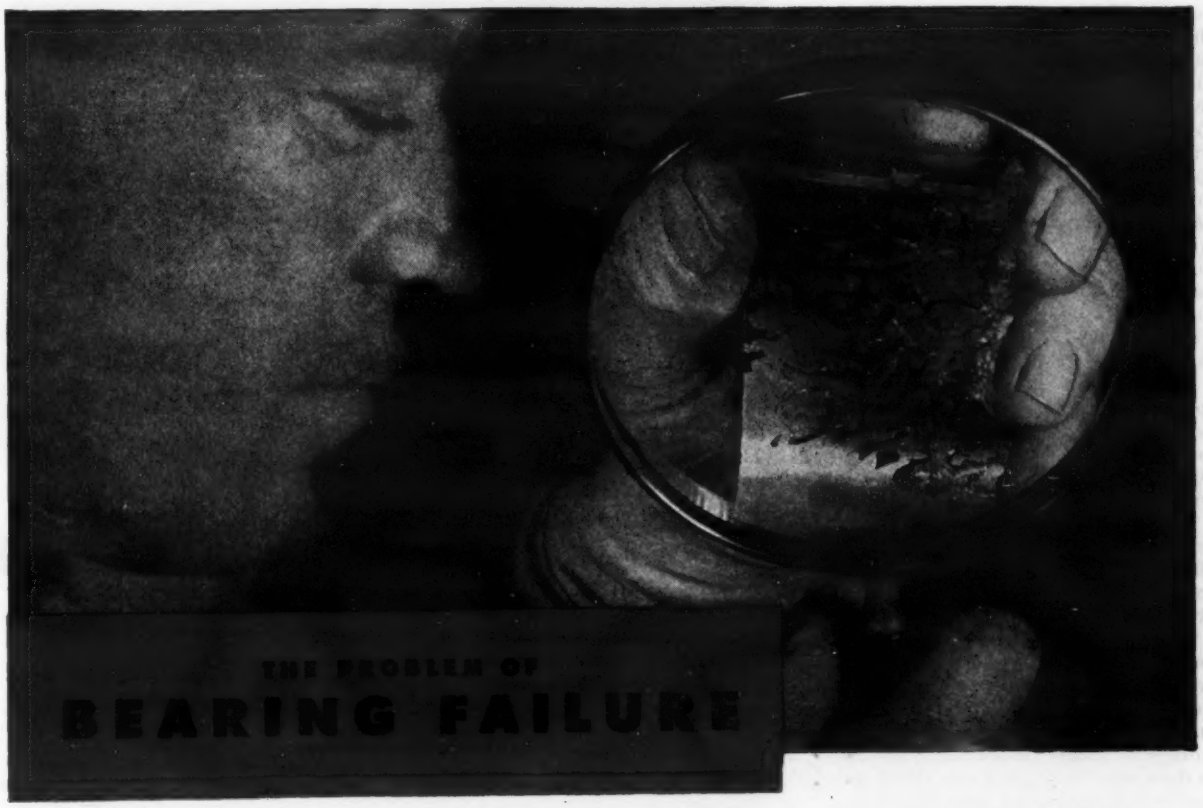

SUCH THINGS as load, speed and temperature have a very material effect on the life of automotive bearings. Sometimes bearing failures are caused by dirty lubricating oil. When the oil is contaminated with water, fuel, sand, dirt, carbon particles or finely divided metal, excessive wear in the bearings results. Present day driving conditions which tend to create low temperature sludge, clog oil lines and screens and result in burned out bearings.

A great many bearings are ruined by overloading (lugging) and overspeeding the engine; by such driving habits as the prolonged use of the engine as a brake in low gear, down long grades; continuous driving at top speeds; failure to shift gears on hard pulls.

WHY BEARINGS FAIL

1. FATIGUE FAILURE: Due to several causes. Among them: overloading; overspeeding; deflections of crankshaft; insufficient oil clearance or stoppage of oil supply; distortion due to poor fit of bearing inserts; out-of-round crank pins and crankshaft journals. As a result of fatigue failure, the bearing metal cracks and flakes out, the rod portion of the bearing failing first, then the bearing cap.

2. WEAR FROM DIRT: The result of infrequent draining and flushing of the crankcase or infrequent servicing of the air and oil bath cleaners.

3. WIPING: Friction heat often causes the bearing metal to melt and run, or to become soft and plastic. This in turn allows the bearing metal to wipe or smear against the harder metal surfaces of the crank pin or bearing journal, cracking and wiping the bearing metal. The causes for this failure are: lack of oil; plugged oil passages; clogged pump screen; worn oil pump; leaky oil pump suction line; broken oil lines or connections; misfit bearings.

4. CORROSION: Prolonged high speed driving and overloading will produce crankcase oil and bearing temperatures above 250° F. in most late model engines. At such temperatures most lubricating oils are subject to oxidation and consequent production of organic acids that are corrosive to bearing metals. The remedy is to use lubricating oils that won't readily form corrosive acids and to drain and flush crankcases frequently.

WATCH DRIVING AND SERVICING

To avoid bearing trouble, don't overload; don't brake with the engine for prolonged periods of time; don't use all your horsepower any more than you have to. Have your engine serviced at more frequent and regular intervals. Use only the best lubricating oil obtainable.

RING-FREE MOTOR OIL HELPS PREVENT BEARING FAILURES

Macmillan Ring-Free Motor Oil has the properties that guard against bearing failure. It has high film strength; high heat resistance; a long cling to the vital parts of your engine; fast penetration. It has a cleansing action that washes away carbon particles, carrying them into the crankcase where these impurities are drained at time of oil change.

FREE FOLDER *on "Bearing Failures—Causes and Corrections"*—Send today for your copy. Address Macmillan Petroleum Corporation, Room 1012, 530 West Sixth Street, Los Angeles 14, California

MACMILLAN RING-FREE MOTOR OIL

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Alameda County

(*Continued from preceding page*)

and a Buffalo blower. This section of the shop also has a 12-inch Black & Decker pedestal grinder and a Little Giant 100-pound trip hammer. A rolling stand for carrying gas tanks was being used, with Airco valves and torch, for welding a dump lever on one of the County-owned trucks. The County also owns a Wilson 200-ampere arc welder, mounted with a Chevrolet engine on a shop-built trailer for use in the field. In the southwest corner of the room a large wall board has been built for holding special tractor wrenches. Installed in the southeast corner, a Baker 4½ x 4 x 2½-inch compressor, driven by a 5-hp G-E motor, and a 12-cubic-foot air receiver provides air pressure for the air lines distributed to necessary points about this building and adjoining ones.

To the south, building No. 2 has a concrete wash rack in the northwest corner with an enclosed room on the east which houses a Malsbary pressure cleaning machine, operated at 75 to 90-pounds pressure with Magnus Permag compound in dilutions to fit the particular job. The center 20 x 30-foot section of this building houses the carpenter shop equipped with work benches and storage cabinets for hand and electric portable tools. The third room, of like size, is utilized for paint storage and hand painting of signs. Air connections for a DeVilbiss paint gun are available in this room but air-painting of any great magnitude is conducted in the open air as no special ventilating provisions are installed inside the building.

Still farther south, and parallel to the spur track entering the yard from the Southern Pacific Railroad tracks, is building No. 3 which houses a 30 x 30-foot storage room for sacked cement with a plank floor at car-door level and a truck-loading platform at the same level on the other side. The remaining 60 feet of this building forms a covered shed for the storage of seasoned special-grade lumber.

South of this building a guyed timber derrick with a Beebe 5-ton hand hoist is erected in a position to unload heavy timbers from flat cars on the spur track, and the adjacent area is utilized for the storage of rough lumber while the area to the west of it is given over to the storage of a considerable quantity of concrete and corrugated-metal culvert pipe. Conveniently near the lumber yard, a small open shed houses a DeWalt bench saw with 16-inch blade driven by a 5-hp motor. Benches carrying roll conveyors extend each side of the saw table for 20 feet. In the open area nearby is a timber ramp useful in loading compressors, small rollers, and similar equipment into the high beds of large dump trucks which the County sometimes uses for transportation of machines, although they also have four low trailers available for such service.

Building 4, most southerly in the west line of buildings, is a 50 x 100-foot covered shed with its north side open, utilized principally for off-season storage of equipment such as two 5-ton Buffalo-Springfield tandem rollers, two Toro mowers, one Allis-Chalmers Model L tractor with a hydraulic power take-off, two Koehring concrete mixers, a 7-S and a 10-S, and three 600-gallon water tanks mounted on old Walker electric truck chassis. Each of these trailer tanks is equipped with a 2-inch centrifugal pump, powered by a Waukesha engine and so connected as to be able either to fill or empty the tank. These tanks are used as water tenders for the mixers when a local water source is not available.

In building No. 5, farther north and 60 x 180 feet in size, is stored a very considerable stock of steel bars, rods, and plates, neatly inserted in a wooden frame built to separate the various sizes. Engineers' stakes are stored nearby, as are tires, grader blades, rotary brooms, and a supply of Sherwin-Williams traffic-line paint. Jackhammers and other air tools, which are cleaned and oiled prior to their storage on a bench along the west wall, are sorted by size. A goodly portion of the building is filled with wooden racks, bins, and cabinets for the storage of bolts, nuts, and hundreds of small automotive parts. The front end of the building provides additional office space for the stock clerks and timekeepers.

North of this building and just to the left of the gate into the Niles yard is a 20 x 20-foot corrugated-metal shed given over to the storage of oils and lubricants, with a canopy in front protecting the gasoline pump and air and water connections.

The personnel employed at the Niles yard, though sometimes varied with the demands for repair work, consists of the following men at present:

County Equipment Superintendent
One sub-foreman
One machinist
One heavy-duty automotive mechanic
One blacksmith with a helper
One carpenter
One painter with two helpers
One handyman
Three gasoline dispensers, one of whom is on duty day and night every day to issue gasoline or receive and relay emergency telephone calls.
Two storekeepers

Post-War Plans

Alameda County's plans for post-war activities include, in addition to a continued intensified program of betterment of bases and additional surfacing, the immediate construction of another tunnel under the Alameda estuary one block west of the present tube. When com-

(*Concluded on next page*)

PROTECT WITH Fultex

TARPAULINS
WIND BREAKS

Fultex waterproof covers give economical protection—one of the most widely used, serviceable covers on the market. Recommended for heavy duty and long wear at low cost.

Quick delivery from stock on standard size covers.

FULTON BAG & COTTON MILLS
Manufacturers since 1870
Atlanta, St. Louis, Dallas, Minneapolis
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WARD

LA FRANCE

THE FINEST HEAVY-DUTY TRUCKS MONEY CAN BUY

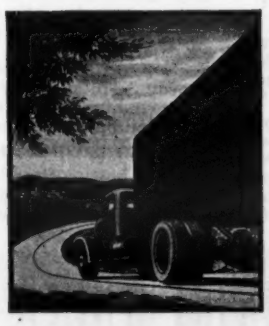
For over twenty-five years, Ward LaFrance has been building a traditionally fine line of heavy-duty motor trucks. Each successive year has brought advances in design and engineering. Today's Ward La France is better than ever.

The finest Ward LaFrance trucks ever built are now serving the United Nations all over the world. They are the huge, type M-1 Heavy Duty Wreckers which have compiled an unbeatable record for stamina and dependability.

Postwar Ward LaFrance trucks and over-the-road tractors, both gasoline and Diesel, offer fleet owners the opportunity for the most efficient hauling in trucking history . . . Write our Sales Department for the Ward LaFrance fleet-owner plan.

FRANCHISES AVAILABLE

Progressive, merchandising-minded concerns eager to expand their profit possibilities by broadening their market potentials, would do well to consider the fertile, heavy-duty truck market. Investigate the profit potential in the Ward LaFrance line . . . Our Sales Department will be happy to supply information about available franchises.



WARD LAFRANCE
TRUCK DIVISION
GREAT AMERICAN INDUSTRIES, INC.
ELMIRA, NEW YORK

Cartoon from ETO by Cpl. Glueck
"Jack's got no use for the old methods since he got home from overseas."

Gen. Reybold Reviews Construction for War

The peak of military construction in this country was reached late in 1942; since that time, the volume of work has declined to about $40,000,000 a month for the past six months. Though still large by peacetime standards, this is small compared to that harassing period when a construction army of about 1,000,000 workers was placing $20,000,000 of construction every day. Speaking before the American Road Builders' Association Annual Meeting in Chicago in January, Major General Eugene Reybold, Chief of Engineers, U. S. Army, reviewed the war construction program and discussed what still lies ahead.

At present, there is still about $250,000,000 of additional construction on the books, General Reybold said, but for the most part this involves modifications and extensions to existing munitions plants, airfields that are being improved for the use of our super-bombers, and to general hospitals and prisoner-of-war camps. As the volume of construction in this country declined, that in the overseas areas has increased.

For example, the roads, runways, and hard-standings needed by the U. S. Army Air Forces alone in the United Kingdom are equal to the construction of a 20-foot concrete highway from New York to Moscow. For the use of heavy planes in all kinds of weather, these airfields had to be built to high construction standards. After construction started, it was a full year before we were ready for the first 300-bomber raid against the Continent, and 19 months before a 1,000-bomber raid could be launched. The construction in all categories already completed by our Engineer troops in the United Kingdom alone equals the lifetime work of 15,000 men, laboring eight hours a day, six days a week, with no time for training or vacation.

"Thus are your machines, your methods and your men still working on the roads to victory," General Reybold said. "They were employed on the Alaska Highway, the Pan American Highway, the Russian supply route north from the Persian Gulf, the Ledo Road in Burma, and on thousands of miles of roads and scores of airfields in Australia, New Guinea, North Africa, and elsewhere along the 56,000 miles of supply lines to all of our fighting fronts. They have worked under all kinds of conditions, in the steaming jungles of the tropics and in the areas of permanent frost of the north country, in the monsoons of Burma, and through the burning sands of the Sahara."

Welders' Clothing

A new booklet listing and describing American Optical safety clothing for male welders has been prepared by the American Optical Co., Southbridge, Mass. The clothing described includes overalls, all-leather pants, hot-weather pants, chaps, aprons, coats, cape sleeves and bibs, short jackets, sleeves and sleevelets, gloves, mittens, and spats.

Copies of this booklet may be secured by writing direct to the manufacturer.

Alameda County

(Continued from preceding page)

pleted, this new tunnel and the Posey Tube will each carry one-way traffic moving in opposite directions. By this arrangement the needs of the heaviest traffic anticipated for many years will be served adequately. Plans, specifications, and contract documents are fully prepared and the necessary arrangements for right-of-way have been completed to enable the County to award a contract for this work as soon as hostilities cease.

Of the $92,000 allotted to Alameda County from the California fund for post-war planning, $30,000 has already been expended on surveys and plans and the present activities of both survey crews and office technicians consist largely of further planning and designing of post-war construction.

Personnel

Alameda County highway activities are entirely under the direction of County Surveyor Wallace B. Boggs who has been connected with the office for the major portion of the past 25 years. He is assisted by Chief Assistant Engineer W. E. Yocom, Maintenance Engineers G. G. Gale and Harry Schreiber, and County Equipment Superintendent John D. Galvin.

Give to the 1945 Red Cross War Fund.

Write for Details

A TOUGH ROLLER FOR TOUGH JOBS

Pierce-Bear 2-5 Tons Variable Weights

Engineered for economical operation where the going is tough. Compact, easy to operate. Narrow rear roller gives heavy-duty compression. Built-in water tanks for wet rolling. Powered with Allis-Chalmers Industrial Heavy-duty Model "B" gasoline engine.

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Night Shift

When the five o'clock whistle blows, it's quitting time for millions. But like as not, there's no let-up for the power shovel, derrick, or crane—and the operating ropes that are such a vital part of them.

Purple Strand Form-Set knows about that. With longer hours, with more rush jobs on the schedule, this husky preformed rope is no stranger to the night shift. 'Round the clock it's working on jobs where only the best wire rope will do—jobs that would soon bog down if the wrong kind of rope were selected.

Tough guy . . . aristocrat . . . Purple Strand Form-Set is both. Tough because it's built for the hardest service of all; because it's so highly resistant to bending fatigue, even on small sheaves and drums. And, in the wire rope "blue book," it's an aristocrat because it's built of premium-quality steel—the finest grade that is ever used in the making of rope.

Where the going is most severe, where overtime hours make extra demands on your rope, you can depend on Purple Strand Form-Set. You'll find it a healthy, versatile rope—one that stays in service longer between reriggings.

When you think WIRE ROPE . . . think BETHLEHEM

Subgrade Troubles In Houston District

Preservation of Concrete Pavements Built on Texas Black Land Requires Practically Continuous Mud-Jacking On "Stitch-in-Time" Principle

✦ DISTRICT 12 of the Texas Highway Department, of which W. J. Van London is District Engineer, with headquarters in Houston, contains a considerable mileage of concrete roads, many of which were constructed on the infamous Texas "black land" before the days of soil studies and without any pretense of subgrade treatment. Though some of these roads are inadequate for present needs, they represent a large investment and it is felt that they should be utilized, by widening and resurfacing, in the betterment program.

Under these subgrade conditions Mud-Jacking becomes an almost continuous operation. At one time it was considered economical to permit joint settlement to occur, patching the low side of the joint with an asphaltic pre-mix and not undertaking jacking operations until a considerable number of contiguous joints required that treatment, when it was performed and the asphaltic patch removed.

Later experience indicated that it is better to treat settlement in its incipient stages, even before the tendency has become active, although this may mean repeated use of the Mud-Jack on the same section of road. At the first evidence of pumping, even before any cracking of pavement or settlement at the joints has occurred, Mud-Jacking operations are now commenced.

Even in cases where no indication of subgrade settlement was in evidence, as much as 3 cubic yards of filler per station has been advantageously placed. For this operation, holes at 6-foot spacing were staggered 2 feet each side of the longitudinal center joint, and a mixture of sandy loam with 4 cubic feet of cement, oyster-shell dust, limestone dust, or a combination of the three, added to each cubic yard of loam, was pumped into cavities under the pavement.

One of the unusual conditions adding interest to maintenance in this district is the presence, on one of the roads near Houston, of a stretch of concrete pavement 16 miles in length, which anyone seeing it for the first time would agree was shattered concrete fit only for removal and replacement. Very noticeable hair cracks are in evidence on the entire surface, dividing it into blocks which in many cases are no larger than a paving brick. The surprising feature is that this section of pavement has been in this condition for several years under traffic of 6,000 vehicles per day, without the slightest evidence of progressive deterioration or any need for extensive repair.

Inadequacy of Subgrade Treatment

In the spring of 1939, a new bridge constructed on U. S. 59 southwest of Houston included the paving of 1,000-foot-long approaches. Based on current accepted practice, the subgrade was compacted to a 90 per cent Proctor density and a waterproof diaphragm of 1 gallon of OA-90 asphalt per square yard was applied to its surface from shoulder to shoulder. The cross section provided for a slope of ⅛ inch per foot on this waterproof diaphragm which was considered sufficient to conduct any moisture entering through the joints harmlessly into the side ditches.

A concrete pavement, 22 feet wide of Bates-type 9-6-9-inch thickness, was placed on the asphalt-treated subgrade. Two ½-inch marginal bars were placed in each edge and the dummy joints, at 20-foot intervals, had ¾-inch asphalt-coated dowels inserted at 16-inch centers with a ½-inch transverse bar each side of the joint. The ¾-inch expansion joints, placed at 100-foot intervals, had the same transverse bars and ¾-inch asphalt-coated dowels, with the addition of expansion sleeves on one end of the dowels.

For the first four years the design appeared to be entirely satisfactory. Normally anticipated movement was evidenced at expansion and contraction joints; no vertical movement occurred; and the riding surface remained excellent. Imagine, then, the surprise and disgust of all concerned when they discovered in the spring of 1944 that new transverse contraction cracks had appeared midway between each of the joints provided by the design and construction.

Hercules and the War

A layman's impression of the tremendous activity of wartime production is told by Lowell Thomas, radio newsman, in a beautifully printed and illustrated brochure describing a trip through the plant of the Hercules Motors Corp., at Canton, Ohio. Besides describing the construction of engines for generating life-saving oxygen, for powering crawler tractors and tanks, for use on battleships, landing craft, and many other military uses, the book outlines the technological developments at Hercules, for both military and civilian uses, since the beginning of its career shortly before World War I. The book ends with a plea for 100 per cent production for military use now, to hasten the war's end and the resumption of peacetime pursuits.

Copies of this brochure "Hercules and the War" may be secured by writing to the company on your official stationery.

LA CROSSE

HEAVY DUTY MACHINERY TRAILERS FOR ALL PURPOSES

— Made by —

La Crosse Trailer & Equipment Company

LA CROSSE - - - WISCONSIN

Baker bulldozers and gradebuilders are not adapted to—they're built specifically *for*—Allis-Chalmers tractors. They go together as snugly as a collar and tie. Look good together too! You get greater efficiency from your A-C power by using Baker equipment.

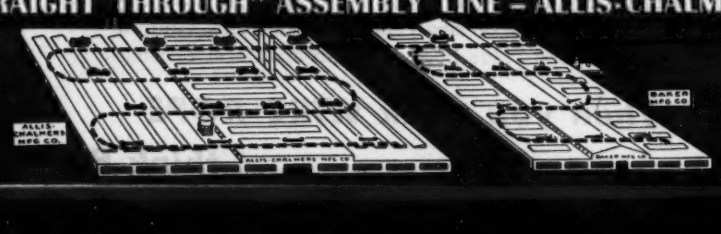
BAKER

Since the introduction of the first A-C crawler tractor—over two decades ago—Baker has designed and built hydraulic bulldozers for every model A-C tractor as it was introduced. There's a model of Baker bulldozer and gradebuilder for every model of A-C crawler tractor. Today Bakers are predominantly favored by users of A-C tractors — because these users have found that *they go together!* Bakers are sold *exclusively* through Allis-Chalmers industrial tractor dealers.

THE BAKER MFG. CO.
585 Stanford Ave., Springfield, Ill.

If it concerns Victory, it concerns us!

"STRAIGHT THROUGH" ASSEMBLY LINE – ALLIS-CHALMERS TO BAKER TO YOU!



The modern Baker plant with its completely equipped fabricating, machining and blacksmithing shops adjoins the Allis-Chalmers crawler tractor plant. When you order an A-C tractor with Baker bulldozer or gradebuilder, your tractor leaves the A-C assembly line, crosses a narrow court and goes on the Baker final assembly line.

A Seaman Pulvi-Mixer breaks up a 4-inch-thick layer of ice, making it an easy job for a rotary broom or grader to clear the street.

Rotary Mixer Aids Ice-Removal Work

Investigation shows that the handling of ice removal from highways and airport runways falls into three general categories, depending upon local conditions and the amount of traffic using the facility. In some cases, the requirement is to roughen smooth ice in order to increase traction, until such time as the ice can be removed completely. In others, where a very heavy deeply rutted sheet of ice occurs, it is necessary to grind the ice down to the level of the bottom of the ruts, while in other cases complete removal as promptly as possible is required.

Seaman Motors, 305 No. 25th St., Milwaukee 3, Wis., points out that the Seaman Pulvi-Mixer, a rotary mixer designed for soil-stabilization and soil-cement operations on highways and airports, is an effective machine in all three types of ice-removal work, although each requires a somewhat different handling of the Pulvi-Mixer. In the first case, the rotor is given a shallow setting and is operated at full speed. This roughens the ice to provide traction. The same technique is used in the second category, except that a deeper rotor setting is employed. In the case of complete removal, the rpm of the rotor is much slower and the rotor is set for deep operation. This breaks up the ice into small pieces which are easily removed from the pavement by rotary broom or blade.

At the Waukesha County Airport recently, it is reported that a difficult ice-removal problem was solved by the use of a Pulvi-Mixer. A very heavy wet snowfall was accompanied by a high wind which blew the snow into long sharp ridges or windrows, some of them 3 to 4 feet in height. Immediately afterwards, the weather turned very cold and these windrows froze so solidly that a 10-ton tractor driving over them did not even crack them. There were so many of these windrows that, of a 3,000-foot runway, only about 600 feet could be used. A Seaman Pulvi-Mixer operating longitudinally on these drifts pulverized successive lifts to a depth of about 8 inches on each pass. A long channel iron was dragged behind to distribute the pulverized material, and in this way the windrows were brought level with the smooth compacted snow on the runway. It is suggested that the use of a rubber-tire compaction roller might have further improved the condition of the runway, although it is reported that the airfield management was satisfied with the job after the Pulvi-Mixer had finished, since all the aircraft were using skis.

Further information on the application of Seaman Pulvi-Mixers to ice removal may be secured direct from the manufacturer. Just mention this item.

The name of a construction firm, neatly painted on all trucks and equipment, pays dividends in publicity and public recognition.

Anvil for Welding Truck

Frequently the equipment repair or maintenance done by a service truck on the job requires an anvil for forming the work or for backing up the metal when hammering is needed in addition to the forming done by welding. The Ray L. Smith Construction Co., El Dorado, Kansas, has met this need by welding a short section of salvaged railroad rail, with the head down, to the steel side member of the service truck bed. The rail, which extends some 8 inches beyond the end of the bed to afford clearance when working on small-diameter objects, provides a flat surface handy for straightening tools, with a straight and sharp edge over which angles may be formed.

The rail section, although a permanent part of the truck equipment, does not interfere with the use of the bed for transporting other equipment and, being above the pipe forming the rear member of the bed, does not interfere with close parking against platforms for loading heavy equipment.

THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD

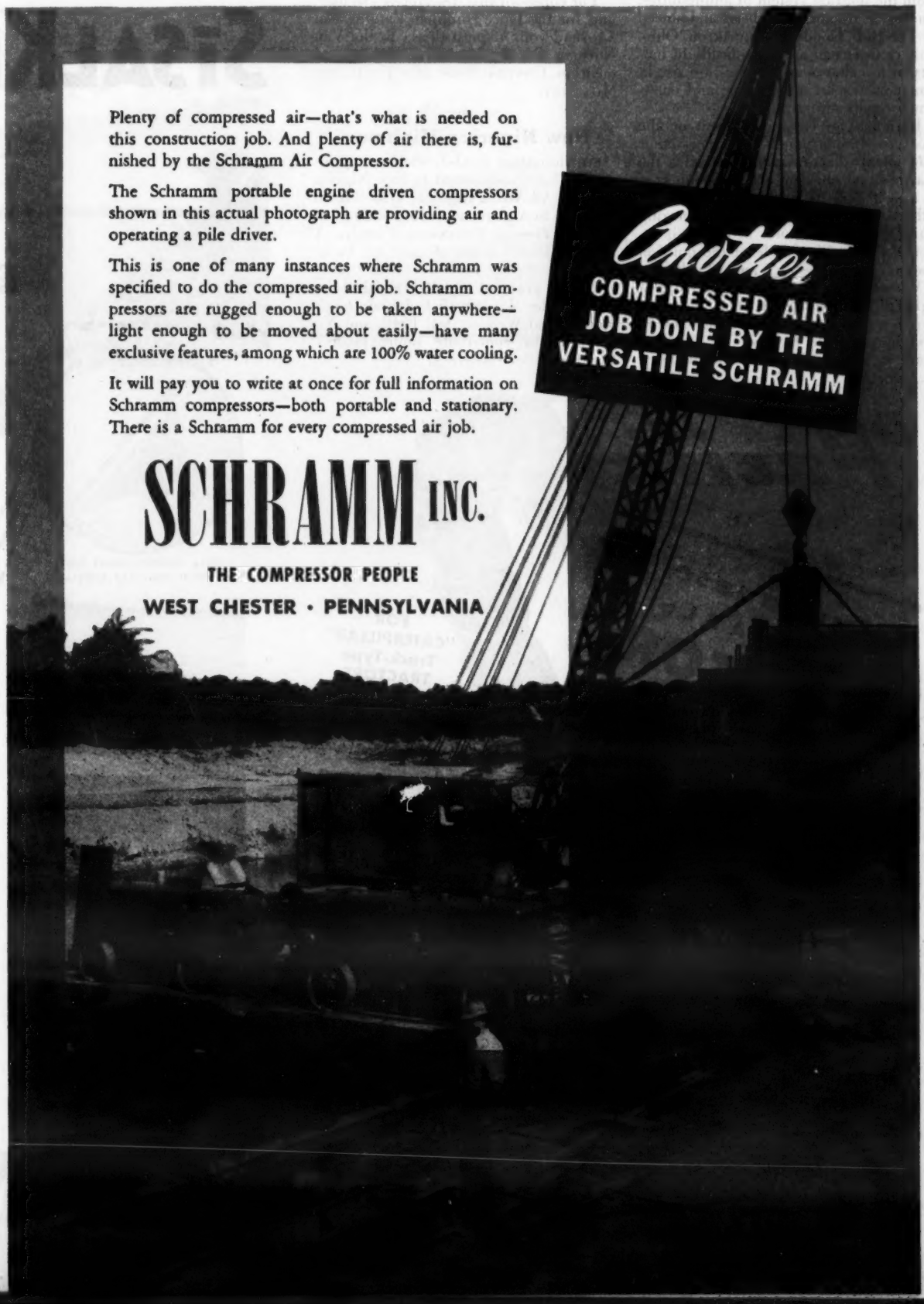
Beebe Bros. ALL STEEL HAND HOIST SEATTLE, U.S.A.

Compact—Powerful—Safe

STANDING ROOM ONLY FOR DURATION

Beebe Bros. All-Steel Hand Hoists carry the highest resale value of any piece of equipment in the world. If you have one not in use, sell it. Many more than are available are urgently needed in the win-the-war program. Thanks.

BEEBE BROS.



Plenty of compressed air—that's what is needed on this construction job. And plenty of air there is, furnished by the Schramm Air Compressor.

The Schramm portable engine driven compressors shown in this actual photograph are providing air and operating a pile driver.

This is one of many instances where Schramm was specified to do the compressed air job. Schramm compressors are rugged enough to be taken anywhere—light enough to be moved about easily—have many exclusive features, among which are 100% water cooling.

It will pay you to write at once for full information on Schramm compressors—both portable and stationary. There is a Schramm for every compressed air job.

SCHRAMM INC.

THE COMPRESSOR PEOPLE

WEST CHESTER · PENNSYLVANIA

The new Goodrich charger for flashlight storage batteries can be attached to the dash and operated from car or truck engine.

Flashlight Battery Is Easily Recharged

A single unit charger for its recently introduced rechargeable wet flashlight storage battery, which can be operated from the ignition system of automobiles, trucks, or tractors, has been announced by The B. F. Goodrich Co., Akron, Ohio. This charger can assure a flashlight battery at top charge at all times, for use in transport trucks, and service and emergency repair units.

Designed for easy attachment on the dash, cowl, side panel, or several other convenient places on the vehicle, the plastic-cased charger may be connected so that it does its work with the vehicle either running or idle. For charging while the vehicle is not in use, it is attached to the "live" side of the ignition system. It operates on 6 and 12 volts, dc.

When the battery is charging, a pilot light glows at the top, and a toggle switch at the side prevents danger of an overcharge while the battery is in the charger. The unit should be mounted vertically so that the battery is upright. Connecting wires are red and black so that ignition wires can be correctly tapped. The red is attached to the positive side of the ignition system, black to the negative.

New Borer and Grinder Described in Bulletin

A new boring and grinding unit designed for precision boring and grinding of car, truck, and tractor connecting-rod forgings up to 5 inches diameter, boring semi-finished babbitt-lined rods, and accurately boring wrist-pin holes in the connecting rods of large trucks and tractors in exact alignment with the rod, is described in a 4-page illustrated circular just received. Although engineered primarily for accurate reconditioning of connecting rods, this No. 222 borer and grinder is designed for ready adaptation to many other precision boring and grinding operations. The circular includes complete specifications, and lists standard and extra equipment available with this unit.

For copies of this descriptive circular, and for the more complete Catalog No. 54, send your request direct to the Van Norman Co., Springfield 7, Mass., and mention CONTRACTORS AND ENGINEERS MONTHLY.

New Nigerian Highway

An important road-development project has been announced to link Nigeria with the All-Africa Highway system from the Cape to Algiers, according to a recent issue of *Foreign Commerce Weekly*. A total of 48,275 miles of road are to be built.

A free grant of £1,810,000 has been made under the British Colonial Development and Welfare Act, 1940, and Nigeria is to contribute approximately £4,600,000 for this work.

Pneumatic Tool Company Completes Fiftieth Year

Fifty years of pioneering in the manufacture of pneumatic tools, rock drills, and kindred equipment are described in an attractive 16-page anniversary brochure issued by the Cleveland Pneumatic Tool Co., Cleveland, Ohio. Besides giving a history of the company's progress from a 10-man factory turning out riveters and chippers and developing the oscillating-type drill to its present expanded size and wartime production, the book gives an interesting outline of mechanical developments in this country from the Gay Nineties to D-Day. It is handsomely illustrated.

Copies of "Pioneers for Fifty Years" are available upon application to the company, written on your official letterhead. Just mention this item.

EXPANSION JOINTS

manufactured by

Servicised is the only manufacturer of four different available types of Expansion Joints for concrete construction. These joints are known as: Asphalt Joint, Fiber Joint, Cork Joint and Self-Expanding Cork Joint, and are widely specified in Airport Runways, Dams, Bridges, Highways, Base Pavements, as well as general construction.

Servicised Expansion Joints are manufactured to comply with all Federal, State and Railroad Engineers Specifications.

Pioneers in the Manufacture of Approved Construction Materials for over twenty-five years.

Send for Catalog of Complete Facts on Expansion Joints

SERVICISED PRODUCTS CORP.
6051 West 65th Street, Chicago 38, Ill.

Pacific

Manganese RENEWABLE TRACTOR RIMS

FOR "CATERPILLAR" Track-Type TRACTORS

LOW COST

EASILY APPLIED

LONG LASTING

PROMPT DELIVERY

Here is a simple, inexpensive way to secure added life from sprocket and idler rims! Before the hub is too badly worn, replace the *rim only* with long-wearing PACIFIC Manganese Steel Renewable Tractor Rims for Caterpillar Tractors.—They are easily welded to old hubs, and are extremely tough and abrasion-resistant, thus providing long, low-cost, trouble-free service.—Write today for PACIFIC Tractor Rim Bulletin.

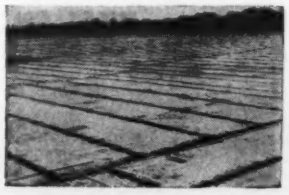
ALLOY STEEL & METALS CO.
1862 East 55th Street, Los Angeles 11, California
Manufacturers of PACIFIC SLUSHING SCRAPERS & SHEAVE BLOCKS • PACIFIC CRUSHING & SCREENING UNITS • PACIFIC ROCK BIT GRINDERS • PACIFIC ALLOY-MANGANESE MILL LINERS & CRUSHER JAWS • PACIFIC TRACTOR RIMS, CRAWLER SHOES & Wearing Parts

SISALKRAFT

BLANKETS SAVE TIME, MANPOWER AND MONEY IN CURING!

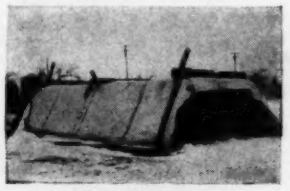
SISAL REENFORCEMENT GIVES STRENGTH AND TEAR RESISTANCE

LOW-COST PROTECTION On ALL Road Jobs!



PROTECTING SOIL CEMENT

PROTECTING ROAD MIX



PROTECTS MATERIALS STORED IN THE OPEN

UNMATCHED in their ability to hold moisture within the slab, SISALKRAFT Road Blankets have a time-proven record as the Number One concrete curing agent — producing denser, longer lasting concrete roads at low cost.

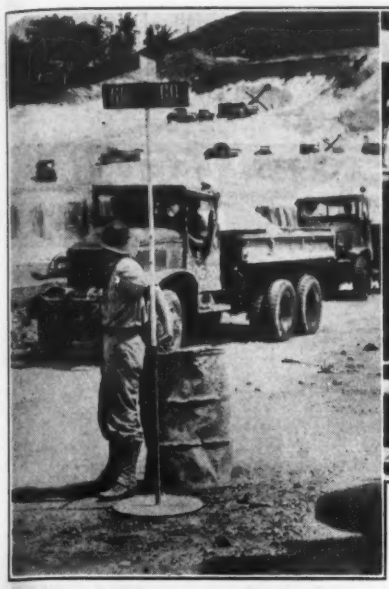
Savings in time, manpower and money are effected by the speed with which two men apply SISALKRAFT Blankets over the slab. No sprinkling — no burlap — just "let 'em lay." The concrete cures automatically! The slab is protected from weather and dirt! The blankets are used again and again.

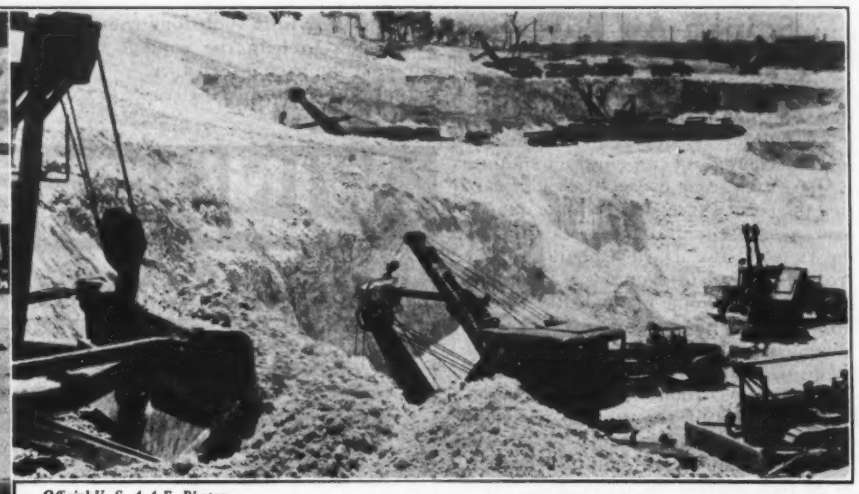
Protect soil cement, road mix, materials and equipment with SISALKRAFT. It's tough, weatherproof, scuffproof, tear-resistant!

As vital war needs decrease, more and more SISALKRAFT will be available for your use. Victory comes first — and that's the way you want it, we're sure.

THE SISALKRAFT CO.
205 W. WACKER DRIVE · CHICAGO 6, ILL.
NEW YORK · SAN FRANCISCO · LONDON · SYDNEY

Manufacturers of SISALKRAFT, FIBREEN, SISAL-X, SISALTAPE AND COPPER-ARMORED SISALKRAFT





Official U. S. A.A.F. Photos

More than one hundred 10-wheel trucks hauled coral day and night for the construction of the Saipan runways, requiring control of traffic as the big loaded trucks sped by on an average 40-second headway.

Superfortress Base Completed at Saipan

Five Months From a Jap Base to a Superfortress Base Is the Story of Army Engineer Aviation Battalion Moving 1,000,000 Cubic Yards

✦ TWO weeks before Saipan was invaded, an Engineer Topographical Unit had brought their maps of the island up-to-date from the latest changes shown in reconnaissance photographs. Five months later those maps were good only as history, for in the five months after the invasion, the face of Saipan had been "lifted" to the extent of 1,000,000 cubic yards of rock and earth. Five months after the invasion, Army Engineers who had done that lifting job were waving to the first Superfortresses leaving on a raid from one of the many newly constructed runways on the island. Those Jap pilots who could return to strike at the base they had lost must not have believed their eyes. They certainly could not believe their maps.

Moving In

The remaking of Saipan began on D-plus-five when an Army Engineer Aviation Battalion started to unload its heavy construction equipment from LST's nosed against a wide coral reef offshore. Acting largely as its own shore party, the Engineer battalion bulldozed and blasted a roadway across this submerged reef; then blasted and cut a "gangplank" up from the reef to the top of the 40-foot bluff rising abruptly at the landing point.

The difficulties of getting its "work-power" ashore were only the beginning of this Engineer battalion's troubles. Rebuilding the small Aslito airstrip captured from the Japs was just a warm-up for the battalion's principal mission of completing a base for the 21st Bomber Command, composed of B-29's. It was the construction of this base which changed the maps of Saipan. Before the base was completed, the Engineer earth movers had become experts in demolition, paving, water supply, and combat.

Building the Base

The Engineers used 226,000 feet of PETN, a combination fuse and explosive, and 372,000 pounds of dynamite to break the coral limestone quarries down for aggregate. In addition to the nearly 500,000 cubic yards of rock and earth which were excavated, moved, and placed by the battalion in leveling the site, the Engineers placed more than

(Concluded on next page)

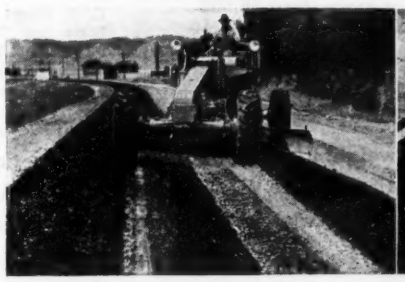
Rx AUSTIN-WESTERN 99-M POWER GRADER

Best for what ails your roads

DITCH CLEANING. "Controlled Traction" speeds the work.

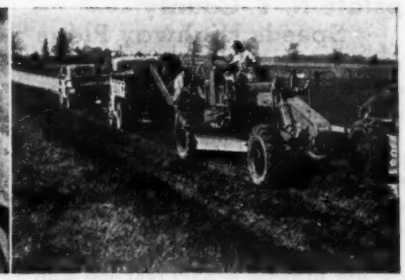
ROAD WIDENING. All-Wheel Drive keeps the front end under control.

BANK SLOPING. Riding the bank for maximum blade efficiency.



BLACK-TOP RESURFACING. All wheels miss the windrow.

BULLDOZING. All-Wheel Drive provides maximum efficiency.



LOADER ATTACHMENT. Removing excess material from ditch and shoulder.

● Throughout the Nation, primary and secondary roads are taking a terrific beating these days. Hundreds of thousands of miles are in desperate need of maintenance; other thousands of miles are almost equally in need of widening and resurfacing.

No single machine can perform *so many* of these jobs *so well* as the "99-M" Power Grader, with its exclusive All-Wheel Drive, All-Wheel Steer and Controlled Traction; and its bulldozer, loader and roller attachments.

Your nearby A-W distributor will be glad to tell you the whole story.

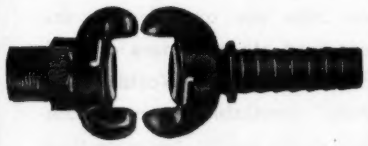
AUSTIN-WESTERN COMPANY, AURORA, ILL.

BUY MORE WAR BONDS

KELLY HOSE COUPLINGS

TROJON AIR HOSE COUPLINGS

MALLEABLE IRON—RUST PROOFED



UNIVERSAL TYPE—Locking heads of all styles and sizes interchangeable from ¼" to 1".

QUICK-ACTION—Instantly connected or disconnected with one quarter turn.

TIME TESTED—DEPENDABLE. Manufacturer of these couplings since 1921.

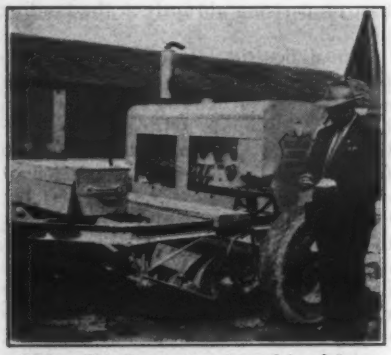
Write for Catalogue No. 110

Distributors in most principal cities

KELLY CHICAGO MACHINERY COMPANY

HOSE COUPLING DIVISION

2524 W. MADISON ST. CHICAGO 12



This roller-type magnet used to pick up scrap metal, nails, etc., on Michigan state highways prolongs the life of many tires, a vital aid to the war effort.

Roller-Type Magnet Cleans Mich. Roads

A magnet which is primarily a large roller attached to a two-wheel trailer and towed behind a maintenance truck at a speed of about 8 miles per hour has been used by the Michigan State Highway Department, Charles M. Ziegler, Commissioner, to remove nails and other ferrous metals from Michigan roads as a protection to hard-to-replace truck and passenger-car tires. A generator mounted on the trailer magnetizes the roller which is made to revolve slowly by a belt driven from the wheels on which the trailer runs. As the roller revolves forward, it becomes demagnetized at the point where nails and other ferrous metals approach a bin, thus permitting the potential puncture makers to drop into the receptacle.

The magnet is powerful enough to pick up anything from a small tack to a crowbar. Bottle caps, nails, spikes, bolts, pieces of tin cans, and countless other sharp metal objects were picked off Michigan pavements, shoulders near the edge of pavements, and gravel roads, the biggest haul coming from pavements. The magnet works very well on pavements and on loose gravel but will not pick up ferrous metals embedded in stabilized gravel roads. There is no danger of anyone receiving a shock by touching the apparatus.

Commissioner Ziegler reports that the magnet has lifted 1,300 pounds of ferrous objects from 1,448 miles of trunkline pavements and 152 miles of gravel roads, at the rate of approximately ¾ pound per mile. Considering the amount of damage that ¾ pound of nails and other sharp metallic objects can do to tires, the value of this magnet becomes readily apparent.

Upstate N. Y. County Speeds Highway Plans

Only recently five county road improvement projects, the balance of eleven originally submitted to the Warren County Board of Supervisors, N. Y., two years ago by Herrick Osborne, County Superintendent of Highways, have been approved by the State Post-War Public Works Planning Commission.

The estimated construction cost of these five projects is $321,000 and with the cost of the first six, already approved and nearing the blueprint state, will make a total of $890,000 for 45 miles of additional paved county roads in this east-central New York State county which is well known as a resort section, including the famous Lake George.

Hint for Tire Mounting

In mounting tires on wide-base rims, it is important, particularly with the use of synthetic tubes, that the next-larger-size tube be used and also the larger flap, according to a recent issue of *The Rubber News Letter*, published by The B. F. Goodrich Co., Akron, Ohio. It is pointed out that synthetic tubes will not withstand stretching like natural-rubber tubes and that, unless this suggestion is followed, tube failures are likely to result.

Saipan Air Base

(*Continued from preceding page*)

400,000 cubic yards of coral on the runway, finishing it off with asphalt surfacing. Bulldozers quarrying the coral literally chewed up two coral mountains.

One dump truck every 40 seconds carried the coral aggregate from the quarry over a specially built express road to the runway site. Hard asphalt shipped from the States in drums was melted at the site in a home-made kettle rigged up by the Engineers from a former Japanese sugar boiler, with a smokestack made of welded oil drums. The plant production was 700 tons of asphalt daily.

Seven miles of runways on one field alone, through cuts as deep as 17 feet in solid limestone, and with fills as high as 20 feet, suggest the unremitting pressure of work on both the Engineers and on their equipment. It was not all construction work, however. On the night of D-plus-12, a typical Jap suicide charge broke through the Infantry lines and overran the airfield. The Engineers dropped their work-tools long enough to grab rifles to help the combat troops wipe out the enemy thrust.

Since the first Superfortress raid from Saipan to Tokyo, the Engineers have also had their share of fighting off retaliatory air raids by the thoroughly stung Japanese.

WINPOWER ELECTRIC PLANTS

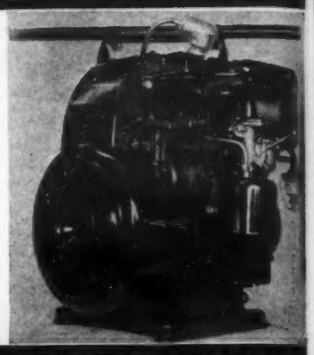
MODELS 12 DL & 15 DL
110-VOLT D.C. MANUAL START

Immediate shipment from emergency stock on many models A.C. and D.C. 350 to 25,000-watt plants. Wire us your requirements.

Light, Safe and Portable
Sturdy and Compact in Construction
Simple in Design and Inexpensive to Operate

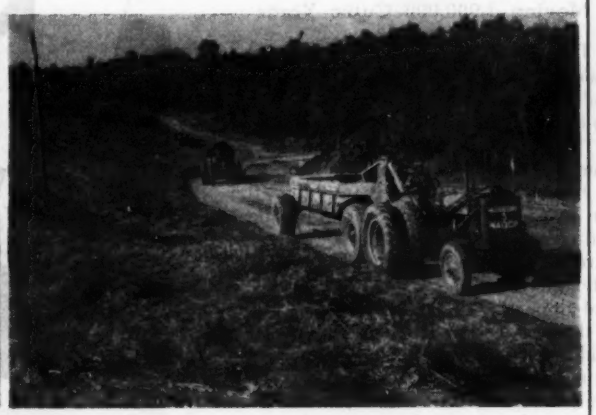
These models have extremely high output for their size and weight. They are recommended for portable work on road and construction jobs, repair depts., fire depts.; indispensable for lighting and operating of electric tools such as portable compressors, drills, saws, sanders, etc.

Send for catalog and Specifications



WIND POWER MFG. CO., NEWTON, IOWA

On The Public Highway – – –



– – – Or The Private Haul Road

IT'S ALL THE SAME TO MISSISSIPPI WAGONS

MISSISSIPPI WAGONS are the only bottom dump hauling units powered by a heavy industrial tractor that can haul payloads of more than 26,000 pounds over most state and federal highways without exceeding the laws on axle loadings and maximum widths.

This is made possible by the weight transferring feature which is exclusive on MISSISSIPPI WAGONS and provides a four-axle unit, instead of a three-axle semitrailer.

A single investment in MISSISSIPPI WAGONS provides the contractor with both his construction and long haul equipment.

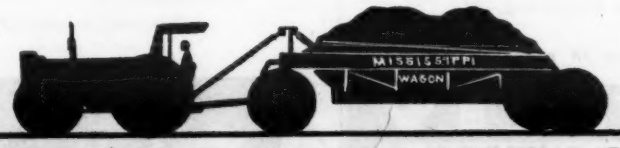
Here are some of the contractors in the State of Louisiana who are now using MISSISSIPPI WAGONS for long haul work over state highways:

C. B. Stuart Company, Baton Rouge,	Six Units
Dixie Dirt Company, Baton Rouge,	Six Units
Morris and Young, Baton Rouge,	Four Units
W. R. Aldrich Company, Baton Rouge,	Three Units
T. L. James Company, Ruston,	Two Units

When construction jobs are awarded in the postwar period, these and other owners of MISSISSIPPI WAGONS will have the "World's Most Modern Hauling Units" available to meet competitive bids—and still make profits, because their single investment in MISSISSIPPI WAGONS provides them with all 'round hauling units suitable for varied types of jobs. Write us, or contact your nearest International Industrial Power Distributor, for full information on MISSISSIPPI WAGONS.

"THE WORLD'S MOST MODERN HAULING UNIT"

MRS



MANUFACTURING CO.
JACKSON, MISSISSIPPI

U. S. Air Forces Official Photograph

The supporting strength of Staminite Skip-Pipe, manufactured by Robinson Clay Product Co. of Akron, Ohio, is well illustrated in this photograph which shows the wheel of a B-24 bomber resting squarely on a section of the pipe used for airfield drainage. Ability to withstand a crushing strength of 38,000 pounds per 2-foot length is one of the reasons this heavy-duty clay pipe is widely used in airport construction.

Delaware Highway Is Repaired and Widened

(*Continued from page 2*)

could handle traffic flowing in both directions. The center parkway strip of grass, with some landscaping of small bushes, averages 50 feet in width, making an ideal barrier to traffic interference with construction operations or vice versa.

Batching Plant

For the concrete work, the contractor set up a batching plant on a siding of the Pennsylvania Railroad about 4 miles from the center of the project. Blaw-Knox bins were used for the bulk cement, sand and stone, which materials were purchased from the General Crushed Stone Co., Glen Mills, Pa., about 35 miles northwest from the plant, and delivered in railroad cars. The sand and stone were stockpiled or loaded direct into the bins by a P&H crane equipped with an Owen 1-yard rehandling bucket.

Meanwhile the areas to be patched had been marked out with white paint by the Resident Engineer. These sections were cut out by Ingersoll-Rand jackhammers powered by a Schramm compressor. When a cut had been made around the outline of the patch, a P&H crane with a 35-foot boom dropped a 1-ton ball on the pavement, shattering the concrete. The plane of cleavage surrounding the patch prevented any damage to the adjoining good sections of pavement. The P&H was then converted to a ¾-yard shovel which loaded the broken concrete into eight light trucks, mostly Fords and Chevrolets, for delivery to neighborhood farmers. Getting rid of the concrete rubble was no problem as farmers desired the material for driveways, gulleys, barn floors, etc.

Patches varied in size from a minimum of 3 square yards to a maximum of 100 square yards. Any section of pavement over 100 square yards in size which needed to be replaced was considered base course and was paid for by volume, while the patch work was paid for by the area in square yards. If the subgrade warranted replacement, a selected borrow material of sand and gravel was used which was hand-tamped and then rolled as base course. No expansion joints had been used in the old pavement, but a plate of 15-gage steel ran down the center, dividing the pavement into two 9-foot lanes. The plate had a keyway, through which ran 1-inch dowels, 4 feet long and spaced 5 feet on centers. This was left in but no expansion joints were inserted in the patches or base course. Contraction joints, con-

thick and running the width and depth of the slab, were inserted every 15 feet in the new concrete.

Concreting

Steel forms were used in the concrete patching and the fine grading was done by hand. The trucks which had been used for hauling away the old concrete were fitted out with partitions so that they could carry two batches from the plant to the Rex 27-E paver.

The individual batches, as weighed, were as follows:

Base Course	
Crushed stone, 2 to ¼-inch	2,202 lbs.
Sand, 4 per cent moisture	1,215 lbs.
Portland cement	564 lbs.
Water	33 gals.
Patching Course	
Crushed stone, 2 to ¼-inch	2,161 lbs.
Sand, 4 per cent moisture	1,073 lbs.
Portland cement	647 lbs.
Water	38 gals.

A stronger concrete was used in the patching than in the base course. Water for the concrete came from streams along the way and was delivered by 2-inch pumps to two tank-truck combinations of a 500-gallon tank mounted on a light truck. These in turn pumped to a 1,500-gallon tank mounted on a trailer towed by the paver and which supplied it directly. For curing, an admixture of a 2 per cent solution of calcium chloride was put into the mixing water before it was added to the batch. All finishing, screeding and floating were done by hand. The surface of the concrete was given a roughened finish with a bamboo hand rake to provide a good bond for the black-top.

Widening Operations

The patching was completed by the middle of November, after which the pavement was widened 4 feet on the west side to make a 22-foot concrete pavement. Grading for this strip was done by a power grader which cut a trough 5

(*Concluded on next page*)

MONDIE DROP and UPSET **FORGINGS**
FOR CONSTRUCTION EQUIPMENT
Such as Dipper Teeth, Trencher Teeth, Gear Blanks, Levers, Tie Rods, Cranks, Crank Shafts, Special Shapes, etc. Forging weight range from 1 to 50 pounds.
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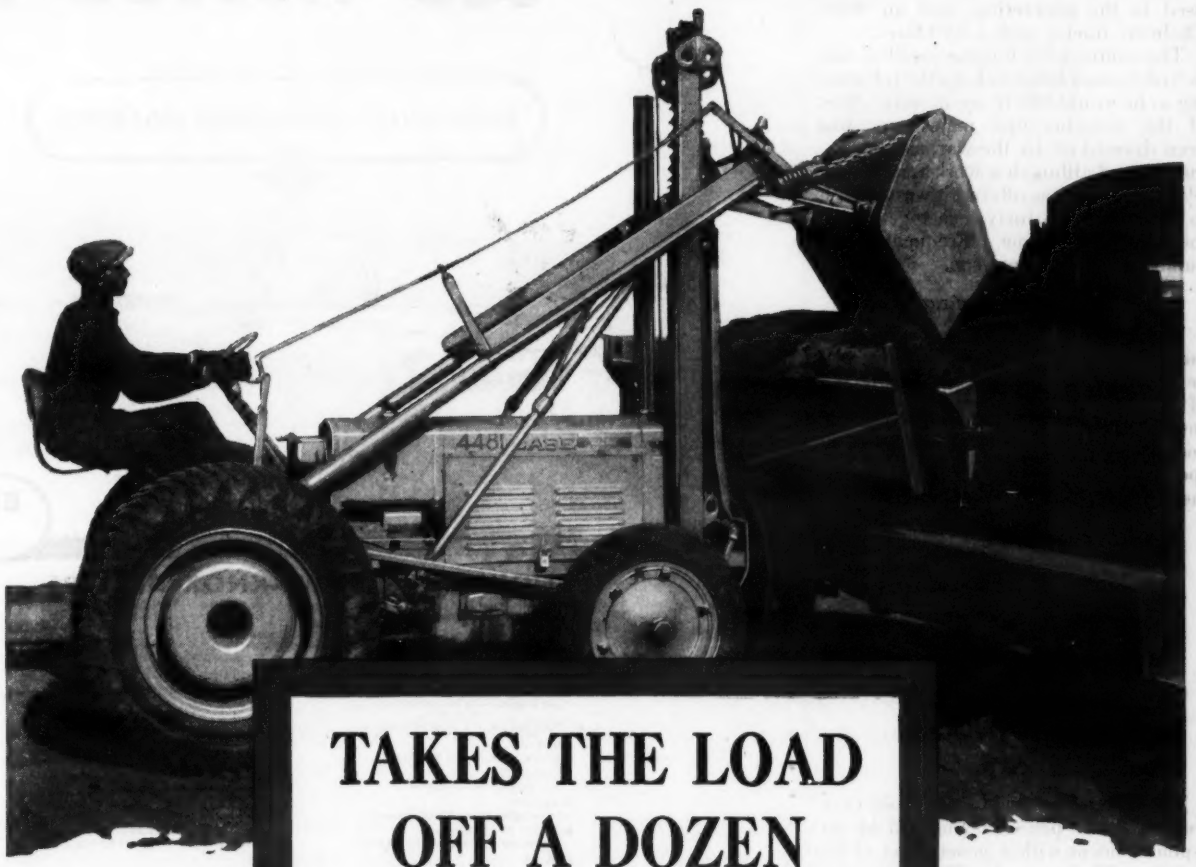
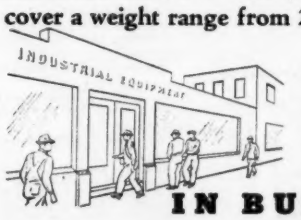


TAKES THE LOAD OFF A DOZEN STRONG BACKS

WHERE earth, cinders, coal, coke, or other loose materials are loaded from ground level into trucks this hydraulic loader, powered by a Case industrial tractor, enables one man to do as much as 10 to 15 men with hand shovels. From stockpile to mixer or from storage bin to conveyor, it replaces a crew with wheelbarrows. It does a great variety of work because it scrapes, it lifts, it carries, it dumps, it loads. * * Case industrial tractors are ideal power plants for mounted cranes, winches, rotary brushes, street and sidewalk snow-plows, because their extra strength and stability enable them to stand up under added burdens. The extra endurance whereby Case tractors work long hours and long years with low upkeep comes from more than 70 years of building power for rugged out-door jobs. Four basic sizes cover a weight range from 2500 to more than 10,000 pounds. J. I. Case Co., Racine, Wis.



CASE

IN BUSINESS TO SERVE YOU

Your Case industrial distributor is located and equipped to supply complete service not only on Case tractors and engine units, but on related equipment. His lines are selected and his personnel is trained with your local conditions and requirements in mind. Take advantage of his varied experience in power and equipment applications.

Delaware Highway Is Repaired and Widened

(*Continued from preceding page*)

feet wide and 8 inches deep along the old pavement by starting 5 feet from the edge with an angled blade and running parallel to the pavement. By moving in toward the road 1 foot for each run, all the material was excavated and piled up on the side. The widening strip is also an 8-inch uniform slab of plain concrete with a 1-inch slope in its 4-foot width, laid with the same equipment used for the patching. A narrow mechanical screed was rented by the contractor to speed up the finishing of the concrete on the widening so that the work would be complete by the end of December before severe winter weather set in. A schedule of 2,500 feet of widening per day was maintained with this objective in view. Ten-foot earth shoulders were then added, the grading being done by a Bay City ¾-yard shovel, the fleet of trucks used in the concreting, and an Allis-Chalmers tractor with a bulldozer.

The contractor's biggest problem was to find enough labor to keep the job moving as he would like to see it move. Most of the neighborhood man-power had been drained off by the war and war industry, and although a work week of six 9½-hour days was offered it was difficult to get more than forty men together on the job at one time. Frequently this number fell to twenty-one.

Spring Surfacing

The job has been closed down during the winter months, but operations will be resumed in the spring with the laying of a 2-inch bituminous surface in two courses, a binder course of 1½ inches and a surface course of ½ inch. The specified compositions of the mixes for the two courses are as follows:

Binder-Course Mix

Sieve Size	Per Cent Passing
1½-inch	100
1-inch	75-90
½-inch	35-65
No. 4	25-40
No. 200	0-5

Surface-Course Mix

½-inch	100
⅜-inch	95-100
No. 4	30-60
No. 10	20-35
No. 20	10-25
No. 40	8-20
No. 80	4-15
No. 200	4-8

The bitumen in each course will vary from 4.5 to 7 per cent and will be an asphalt cement with a penetration of 85 to 100 at 77 degrees F. The contractor has arranged to secure the mix from the General Crushed Stone Co. of Glen Mills, Pa., which will set up an asphalt plant near the Pennsylvania Railroad siding at Mt. Pleasant, Del. Aggregate will be transported by rail to this plant which is 5½ miles from the center of the project.

Major Quantities

The major estimated quantities on this improvement, which will cost $148,582, are:

Removing concrete pavement	2,240 sq. yds.
Excavation	8,100 cu. yds.
Selected borrow	3,800 cu. yds.
Concrete patching	2,600 sq. yds.
Cement-concrete base course	2,900 cu. yds.
Bituminous-concrete surface	10,050 tons

This reconstruction is being done for the Delaware State Highway Department, of which W. W. Mack is Chief Engineer and W. B. McKendrick, Jr., is Assistant Chief Engineer. C. C. Reynolds, Division Engineer of New Castle County, is Resident Engineer. Louis Blake is Superintendent for James Julian, the contractor.

Sample of Post-War Work

The type of work described here is typical of what will be done in Delaware during the first year of its three-year post-war construction period. So many roads have been neglected during the war that 85 per cent of the first year's work will be devoted to reconstruction of highways, that is, salvaging old concrete pavements by patching, widening narrow roads, laying new concrete base courses, rebuilding culverts, and resurfacing with plant-mix bituminous concrete.

One new construction project which is included in the first-year program is a grade separation on the B & O Railroad at Elsmere, near Wilmington.

Plans and surveys for the first-year program are now more than half completed and will be finished during 1945. The entire program will entail the expenditure of $15,000,000 which will be equally divided over the three-year period, and will be financed by a combination of Federal and State money. About 128 miles of highways will be rebuilt the first year, including 5 miles of reconstruction in the city of Wilmington, and the remainder scattered throughout the state. During the second and third years of this program, the work will be mainly new construction on the state trunk highways.

March has been designated Red Cross Month, during which its 1945 War Fund must be raised. Give now!

Arc-Welding Cast Iron

Among the features of No. 4 of Volume 2 of "The Eutectic Welder", issued by Eutectic Welding Alloys, Inc., 40 Worth St., New York 13, N. Y., is an unusual article on the progress which has been made in the art and science of arc-welding cast iron. Other articles describe the detailed methods used in welding a large cast-iron rotor without pre-heating, repairing a worm gear, and welding a diesel block.

Copies of this and other issues of this publication as available may be secured direct from Eutectic.

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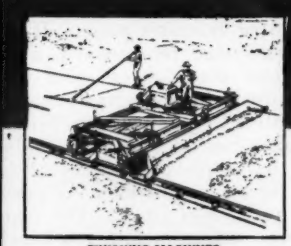
An On-the-Job Opinion

"The production record of high-quality concrete slab that we obtained on our ... of Illinois airport project was largely made possible through the use of the Blaw-Knox Concrete Paving Spreader and Finishing Machine. These machines operated efficiently and kept pace at all times with the maximum output of concrete from two 34-E Rex Dual Drum Paving Mixers and they aided appreciably in the solution of our man-power problem on this work."

by J. H. Hohnke, ... Manager
Cooke Contracting Co., ...



FINISHING MACHINES FOR ROADS AND AIRPORTS

PAVING ... FOR ROADS ...

M-R-S Plans for 1945; More Dirt-Moving Wagons

The present plans of the M-R-S Mfg. Co., Jackson, Miss., producer of Mississippi Wagons for hauling dirt, gravel, sand, limestone and similar materials, call for double production during 1945, according to a recent announcement. During the past year, this company has sold fleets of these Mississippi Wagons throughout the United States and foreign countries, and anticipates increased demand for this type of equipment in the future.

At present, Mississippi Wagons are being produced in three sizes, of 9½, 10½, and 15-cubic-yard heaped capacities, and are powered by a special International Harvester diesel wheel tractor.

The sales organization of M-R-S Mfg. Co. is headed by C. H. King, General Sales Manager.

Gardner-Denver Export Division Reorganized

In order to facilitate handling its extensive export activities, and in anticipation of expanded export sales, the Gardner-Denver Co., Quincy, Ill., manufacturer of a line of rock drills, compressors and oil-field equipment, has revamped its entire Export Division. G. V. Leece, Vice President, will head the division, with offices in the Woolworth Bldg., New York City, where he will be assisted by S. T. Brown, Assistant Manager, and Harold Weber, Assistant Sales Manager.

Edward Church is now associated with the Denver, Colo., office of the Export Division, and will devote his efforts to the further development of rock drills and allied equipment which are manufactured at that plant. C. E. Kaiser, formerly Assistant Export Manager under Mr. Church, will take charge of the Export Division in Quincy.

Cummins Engine Names Cleveland Regional Mgr.

F. W. Sparks has been appointed Manager of the Cleveland Region by the Cummins Engine Co., Inc., Columbus, Ind., manufacturer of diesel engines for automotive and industrial applications. Mr. Sparks has been a member of the Sales Department for several years and most recently has been located in the home office. As Manager of the Cleveland Region, which includes the states of Ohio and Michigan, he will maintain headquarters at 805 Fidelity Bldg., Cleveland 14, Ohio.

The Job—University of Illinois Airport at Champaign, Illinois—a Civil Aeronautic Authority project. Paving 3 main runways, each 150 ft. x 5300 ft. plus taxiways.

The Contractor—Cooke Contracting Company, Detroit, Michigan. J. H. Hohnke, Project Manager.

*__The Equipment__—That unequaled paving combination—a Blaw-Knox Automatic Transverse Blade CONCRETE SPREADER . . . and a Blaw-Knox FINISHING MACHINE . . . handling the maximum output of two dual drum 34-E paving mixers.

The Record—288,000 sq. yds. of 9-in. concrete slab in a 60 (10 hr.) day calendar period, in spite of time lost due to weather, shortage of man-power and materials and equipment change-overs . . . This is equal to 25 miles of road pavement 20 ft. wide . . . Best single day's production (10 hours' work) was equivalent to 3500 linear ft. of road slab 20 ft. wide.

For Speed Plus Quality—Blaw-Knox Has the Paving Equipment for Roads and Airports

Your nearest Blaw-Knox Distributor will handle your inquiries promptly and efficiently.

**Vibratory attachments are furnished for Blaw-Knox Pavin Spreaders or Finishing Machines*

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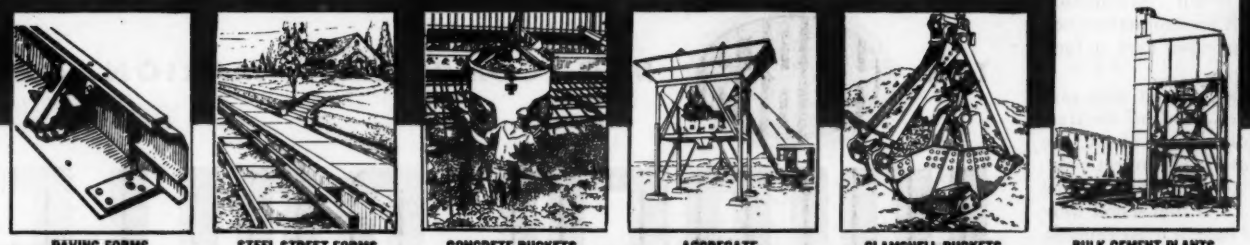
ARMY NAVY
7 plants of Blaw-Knox Company have been awarded the Army-Navy "E" for excellence



Protection Offered By Contract Bonds

Viewpoint of an Insurance Salesman Presented to The Associated Equipment Distributors at Chicago

✦ AT the Twenty-Sixth Annual Meeting of the Associated Equipment Distributors in Chicago, Fred A. Moreton of Salt Lake City, Utah, immediate past president of the National Association of Insurance Agents, discussed the protection provided by contract bonds to owners, contractors, material men and equipment distributors, and the responsibility resting on the shoulders of a surety. Mr. Moreton has endeavored to answer the complaint that apparently surety companies bond every contractor, whether he is entitled to a bond or not, and that frequently equipment distributors and others are not informed that a contractor is in financial difficulty until as long as a year after he has become insolvent. Mr. Moreton said in part:

The Value of Surety

"The function of the contract bond is not always fully understood and its value is often underestimated by those who value it in terms of dollar claim payments paid direct to the owner or claims paid to third parties in settlement of labor and material claims. As a matter of fact, the interests of the owner, whether it be government, state or private, are best served when the contract-bond underwriter has furnished a bond upon which there is no loss and when the bonded contractor completes the contract in the agreed time in accordance with the plans and specifications and promptly discharges all claims.

"The requiring of a bond prequalifies the contractor and minimizes chances of loss to subcontractors, material houses, and equipment distributors, because many unqualified contractors are thereby eliminated. The bond is a very powerful ally in case of the death or disability of the owner, partner or key man in the contractor's organization, and sometimes is called upon to fill a gap caused by fire or other casualties resulting in losses not adequately covered by insurance. It acts as a safeguard in case of over-extension or a sharp rise in the cost of labor or material or other unforeseen conditions, such as unexpected hard rock or floods.

"Numerous defaults have been avoided as a result of claim prevention activities of surety companies. Numerous contractors are tided over financial and other difficulties with the assistance of the surety, usually without the knowledge of the owner or inconvenience to the owner.

"Contractor-bond underwriting procedure has been developed apace with the development of the construction industry. Constant changes in investigation, underwriting, and rating procedures have been developed to meet the constant change in construction practices. Contract-bond underwriters have available experience data and sources of performance and credit information which have been built up and maintained at a considerable expense over a long period of years.

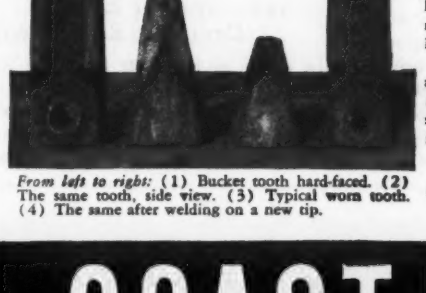
"Now to answer my friend who said that surety companies bond *all* contractors. As I have pointed out above, the surety business is based upon select risks. No man is able to give the exact recipe for financial success. If that secret were divulged, we would have a most remarkable world. In business we must make our own decisions. There are some general principles which experience has taught us to follow in observing the successful contractors. The Associated General Contractors has a slogan: 'Skill, Integrity and Responsibility'. These same three words could well be used as the yardstick by which an applicant for a contract bond is judged. The experience and general standing of the contractor are of the first importance. New concerns must prove themselves. It is always helpful when the members of new firms are themselves able and experienced men of good reputation. Competitors, local bankers, other suppliers often have an excellent basis for judgement on individuals and firms, and their composite opinion and the past record are an excellent guide.

The Equipment Distributor

"The equipment distributor is in a preferred position and has two very valuable advantages in reducing or eliminating credit losses. (1) You sell your equipment as a rule under a title-retaining note and if the monthly payments are missed you can repossess. (2) If the monthly payment is missed, you can tell

(*Concluded on page* 83)

Your Worn Dipper Teeth Are Still "GOOD AS GOLD!"



From left to right: (1) Bucket tooth hard-faced. (2) The same tooth, side view. (3) Typical worn tooth. (4) The same after welding on a new tip.

DON'T DISCARD old bucket teeth, — no matter how badly worn. Rebuilding and hard-facing with Coast Metals will make them good as new,—at less than half the cost of new replacements!

Patented Coast Metals Hard-Facing alloys are easily welded to all ferrous metals, including manganese steel, alloy steels, cast iron and chilled iron. Write for full details.

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COAST METALS hard-facing weld rods
MAKE YOUR EQUIPMENT LAST LONGER

R's for the runways that lead to the air,

H for the Hubers you'll always find there!

Yes, sir, you'll find Huber Rollers busy all over the world on airstrip construction and maintenance . . . smoothing the take-offs and landings of our military aircraft . . . and bringing closer the day we can start delivering these new and improved Hubers to you.

THE HUBER MFG. COMPANY • MARION, OHIO, U. S. A.

HUBER ROLLERS

Burma Road

(*Continued from page 27*)

penses, and various equipment are excluded from these cost figures.

Patriotism Built the Road

The chief reasons for the completion of the Burma Road with the small funds available, in such a short period of time, and with such poor equipment, are as follows:

1. The patriotic peasants of all districts willingly gave support to the project, with the result that more than 100,000 people worked on the job from start to finish.
2. The aid of the Central Government with $3,200,000 C.N.
3. Provisions of food to the conscripted laborers were adequately solved by each district. This encouraged the people to work on with sufficient faith.
4. The conscripted laborers, despite working under heavy climates, and sleeping in the open, showed no signs of slackening.
5. The administration's general staff and technicians, in spite of all sorts of hardships and difficulties, carried out their duties most magnificently.

The amount of sacrifice by the people of all districts of Yunnan Province in getting the route completed is unimaginable. Correspondingly staggering was the blow of its loss.

The Road Is Closed

Opened in 1939, the road quickly increased in value as Japan, by 1942, had closed China's southern ports. Except for pack trains, the only land supply channel between China and the United States was via Burma Road trucks. The Japanese drove British and limited Allied forces from Burma, and by May, 1942, controlled the Burma termini of the road and were in western China to the Salween River. The defending Chinese blew up the vital Salween River bridge and destroyed the road by "tank-proofing" it for 15.5 miles along a section east of the Salween River Canyon. After the assignment of U. S. Army advisory personnel, the Chinese, early in 1943, started definite plans of reconstruction.

Reconstruction Starts

While the air highway opened over the Himalaya Mountains by the U. S. Army Air Force Air Transport Command has exceeded in volume the monthly tonnage moved over the Burma Road in early 1942, supplies still remained a bottleneck to more effective warfare against the Japanese from China. In preparation for rebuilding the back-door land supply route to China, the Burma Road, General Stilwell assigned Lt. Colonel Louis Y. Dawson, Jr., Corps of Engineers, in November, 1942, as an engineer with a group of eight officers ordered from India to China as a military mission. The group was to help China set up a Services of Supply and to provide for communications and a supply of munitions, matériel and equipment for the Chinese armies. The Burma Road, supply route to the then-defensive Salween fighting front and potential outlet to the mass of supplies in India waiting movement to China, became Colonel Dawson's "baby". He was the only American officer on the road until mid-1943 when nine other American officers arrived. Nineteen American enlisted men had joined the project in the meantime and more American personnel were added later.

First Survey

In January, 1943, an inspection party, including Dr. Lee Wen Ping (Ph.D., Michigan 1936), now Assistant to the Chief Engineer, Director C. C. Kung of YBHEA, and Col. Dawson of the subsequent Burma Road Engineers, made an inspection tour of all the Burma Road then in Free China. Americans in the party were surprised at the job Chinese hand labor had done in building the road and erecting stone-arch bridges and walls. As the result of this trip, the first survey ever made of the road was run by the Chinese government (completed in April, 1943), giving the engineers data with which to estimate reconstruction needs. This tour also revealed that the Chinese had some road equipment standing in the open, unused for over a year, and in need of repairs.

U. S. Army Photo from British Combine

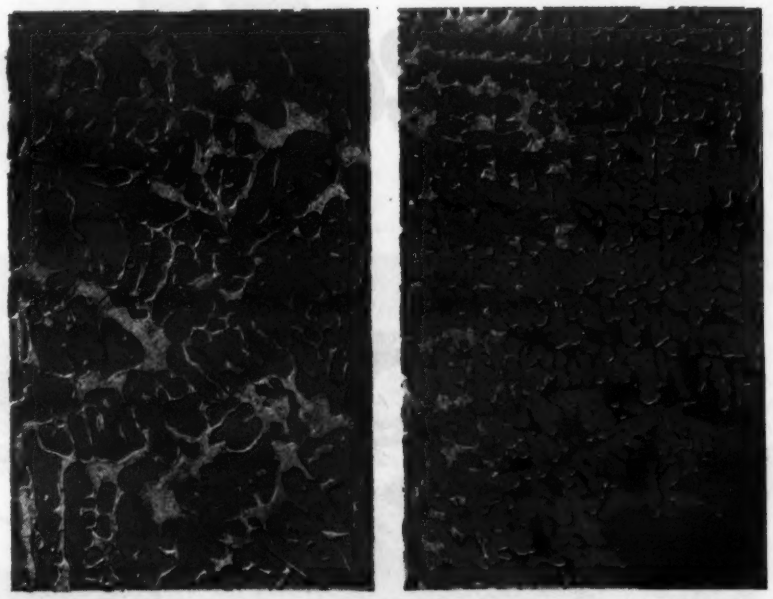
American and Chinese of the Y-Force building a bridge across the Salween River.

Salvaged Equipment

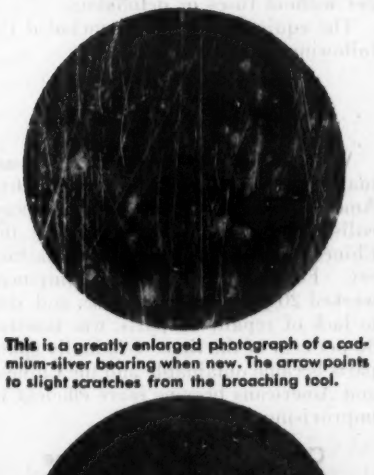
It required six months to assemble the

(*Concluded on next page*)

How RPM DELO Eliminates Diesel Bearing Corrosion

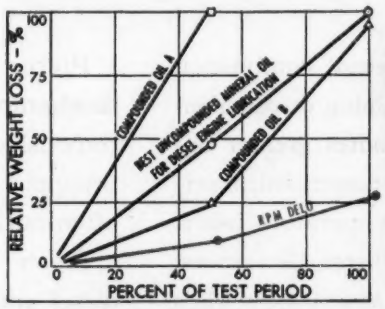


This is what happens to a copper-lead bearing when unstable lubricating oils that become corrosive, attack the lead. The picture on left shows a greatly enlarged cross-section of a new bearing, the copper in red, and lead in light grey. The picture on right shows the same type of bearing with the lead (light grey) eaten away from the surface by corrosion, leaving a copper honeycomb which disintegrates under pressure. RPM DELO Diesel Engine Lubricating Oil eliminates such corrosion of copper-lead or any kind of bearing.

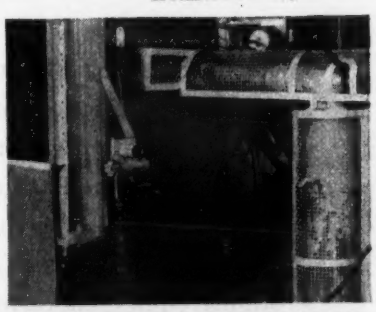


This is a greatly enlarged photograph of a cadmium-silver bearing when new. The arrow points to slight scratches from the broaching tool.

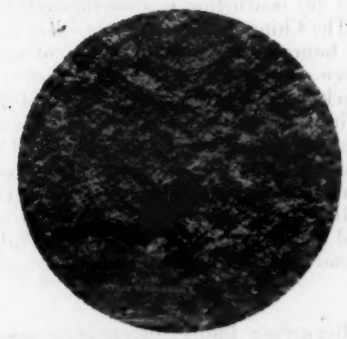
The same type of bearing is shown here, after use with RPM DELO. The bearing surface is in excellent condition.



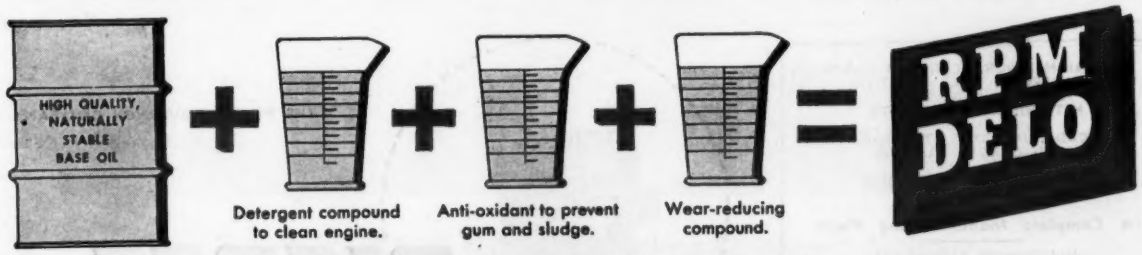
This chart shows what happens when copper-lead bearing strips are placed in oil which is subjected to oxidizing conditions at a temperature of 280° F. Note the extremely low weight loss with RPM DELO by comparison with other oils, compounded or uncompounded.



This photo shows equipment used in a 500-hour test on RPM DELO by Standard's research organization—RPM DELO has met every laboratory and field test. For specific technical information, write, asking for booklet T-2, Standard of California, San Francisco 20, Calif.



This bearing was used with an unstable lubricating oil that became corrosive in service. Note that the entire surface is pocked and that actual breakdown is occurring on the surface. This can be eliminated by the use of RPM DELO.



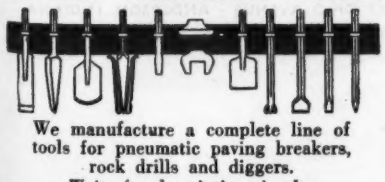
STANDARD OF CALIFORNIA

RPM DELO has world-wide distribution and is marketed under the following names: RPM DELO, Caltex RPM DELO, Kyso RPM DELO, Signal RPM DELO, Sohio RPM DELO, Imperial RPM DELO

CONCENTRATE

"BICKNELL BETTER BUILT"

PAVING BREAKER TOOLS



We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.

Write for descriptive circular

BICKNELL MANUFACTURING CO.

12 LIME STREET ROCKLAND, MAINE

Burma Road

(*Continued from preceding page*)

scattered equipment, overhaul it, and make such repairs as were possible. This road equipment, owned by the YBHEA, had come from four different countries: America, England, France, and Germany.

The Chinese expressed a conviction that though motor equipment was good in the United States, it was no good on such terrain in China. The U. S. Engineers in their advisory capacity thought otherwise.

With the salvaged equipment, all eight pieces, Col. Dawson prevailed on the Chinese to organize a "Joint Construction Force", with the Chinese to have a man opposite each American in the force. The U. S. Army Corps of Engineers were to furnish engineers and equipment operators and some parts, and the Chinese furnished their equipment, common labor, such diesel oil and parts and such explosives as they had. Explosives in possession of the Chinese was several-year-old German black powder without fuses or detonators.

The equipment on hand included the following:

3 Caterpillar D4 tractors with bulldozers
1 Caterpillar No. 112 motor patrol
1 Ruston-Bucyrus ⅝-yard shovel
1 Ingersoll-Rand air compressor
2 German air compressors

With this equipment, when it was actually put into operation, were five American officers and nineteen American enlisted men, endeavoring to show the Chinese what could be done by machinery. For six months this equipment worked 20 per cent of the time, and, due to lack of repairs or parts, was inactive 80 per cent of the time. Gradually spare parts became obtainable and the Chinese and Americans became more efficient in improvising repairs.

Costs Checked by Chinese

To enable the Chinese officials to compare costs and also accomplishments by machinery with the results obtainable by hand labor of coolies alone, a sector about 6 miles long was selected. This included about 4 miles of the roughest possible terrain along the road; some of the rock was so hard that an air-hammer bit would drill only 1 inch before it had to be sharpened. This test section was completed with a Chinese workman opposite every American operator on each piece of equipment. No opportunity for instruction was overlooked.

The Chinese engineers kept exact data on hours of work and yardage of each piece of equipment and the cost (at black market prices) of diesel-oil requirements, and compared this cost with the yardage costs of work on the road by coolie hand labor. The net result was that Chinese skepticism over the advisability of using machinery to reconstruct and maintain the Burma Road was fully removed.

Maintenance

Regarding future maintenance possibilities, Lt. Colonel Louis Y. Dawson, Jr., from two years' experience with the Burma Road Engineers, and their predecessors, believes that a Burma Road force of 24 road patrols, 12 bulldozers, and 12 air compressors properly operated could reduce the road traveling vehicle maintenance costs 50 per cent and reduce the vehicle fuel requirements 20 per cent below the costs as of August, 1944. As a military supply road from Kunming and as a combat road in the Salween area, the road has already withstood monsoon rains, and slides have not put it out of operation longer than a matter of hours.

U. S. Army Photo from British Combine
An American tractor and bulldozer and Chinese laborers carrying basket loads of crushed rock work together on the reconstruction of the Burma Road.

The Fruits of Cooperation

American participation in the reconstruction of the Burma Road has been with engineering advice, operational instructions, some supplies, persuasion, friendship and the personalities of a small hand-picked group, now called Burma Road Engineers. All money has been allotted by the Chinese government to and spent by Chinese officials of the Yunnan-Burma Highway Engineering Administration. The Chinese furnished engineers, up to 30,000 coolie laborers at a time, and supplies and material. This road reconstruction is probably the outstanding example of Chinese-American cooperation.

PRECISION AIRCRAFT ENGINE PARTS
COMMERCIAL HEAT TREATING
SEASONING OF STEEL
NITRIDING—A SPECIALTY

CADMIUM, ZINC, TIN and HARD CHROME PLATING

ALL KINDS OF GRINDING OPERATIONS

A Complete Manufacturing Plant

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ENGINEERING DIVISION
AGERSTRAND CORPORATION
Muskegon, Michigan
Sales Office: 1402 Kales Bldg., Detroit 26, Mich.

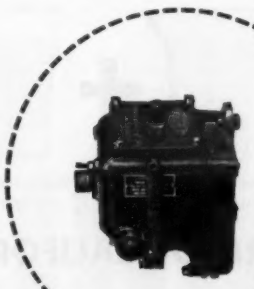
BRUTE POWER

● Good governing of internal combustion engines in construction, mining or other industrial applications, promotes greater operating efficiency and longer, economical service—two things dear to the operator's heart.

And that's the reason Pierce Governors, as original equipment on many of the world's leading engines, and replacements on many others, are setting the pace in every field where internal combustion power is used.

Pierce governing is good governing—mechanically dependable and sensitively responsive through the time-proved flyball principle. And in service, Pierce Governors often outlast the engines, themselves.

Pierce Governors for gas, gasoline and diesel engines are available in more than 2,000 models. If your engines are not now Pierce-governed, write for full information and the new Pierce catalog. And specify Pierce on the new engines you buy.



PIERCE GOVERNORS

THE PIERCE GOVERNOR COMPANY, INC. • 1615 OHIO AVENUE • ANDERSON, INDIANA
Manufacturers of Pierce Precision Governors and Sisson Automatic Chokes

Construction Volume

(*Continued from page 1*)

poses is expected to continue in 1945 at about the 1944 rate, with an estimated decline in new housing being offset by increased non-military work in the industrial field and other non-residential categories.

Military construction within the United States is expected to drop from $730,000,000 to $480,000,000, and Government-financed plant construction from $745,000,000 to $470,000,000. Such non-industrial construction as highways, sewer and water facilities, conservation and development, and similar work is expected to total $1,550,000,000, a slight increase over the 1944 activity for these types, WPB estimates reveal.

Sours Enters Sales Field

Hal G. Sours, former Ohio Director of Highways, and Eugene E. Baldwin, of Taylor & Baldwin, Columbus, Ohio, have formed a partnership to sell highway materials and equipment. The principal products which they will distribute are asphalt, road oil, chemicals for ice control, bituminous distributors and accessories, street sweepers, salt and stone spreaders, and truck scrapers. Several other products will be added during the next few months. The new firm, Baldwin & Sours, is located at 83 South High St., Columbus, Ohio.

Mr. Sours has been in state and county highway work for the past 24 years. He spent three terms as County Engineer of Summit County, Ohio, and was with the State Department of Highways in northern Ohio for several years. For the past six years, he has been in the Columbus Office, first as Chief Engineer, and then Director. For many years active in highway association work, Mr. Sours is a past president of the American Road Builders' Association, having served in that office for two years, and more recently was Vice President of the American Association of State Highway Officials.

Mr. Baldwin has been a member of the firm of Baldwin & Taylor for the past 20 years. Mr. Taylor, who died four years ago, was a former Ohio Highway Director.

New Richkraft Dealer

The Richkraft Co., Builders Bldg., Chicago 1, Ill., has announced that the Cleveland Builders Supply Co., Marion Bldg., 1276 W. Third St., Cleveland 13, Ohio, will handle its line of concrete curing materials on both road sales and general sales in the Cleveland territory.

. . . with Aggregate from the Cedarapids Morok . . .

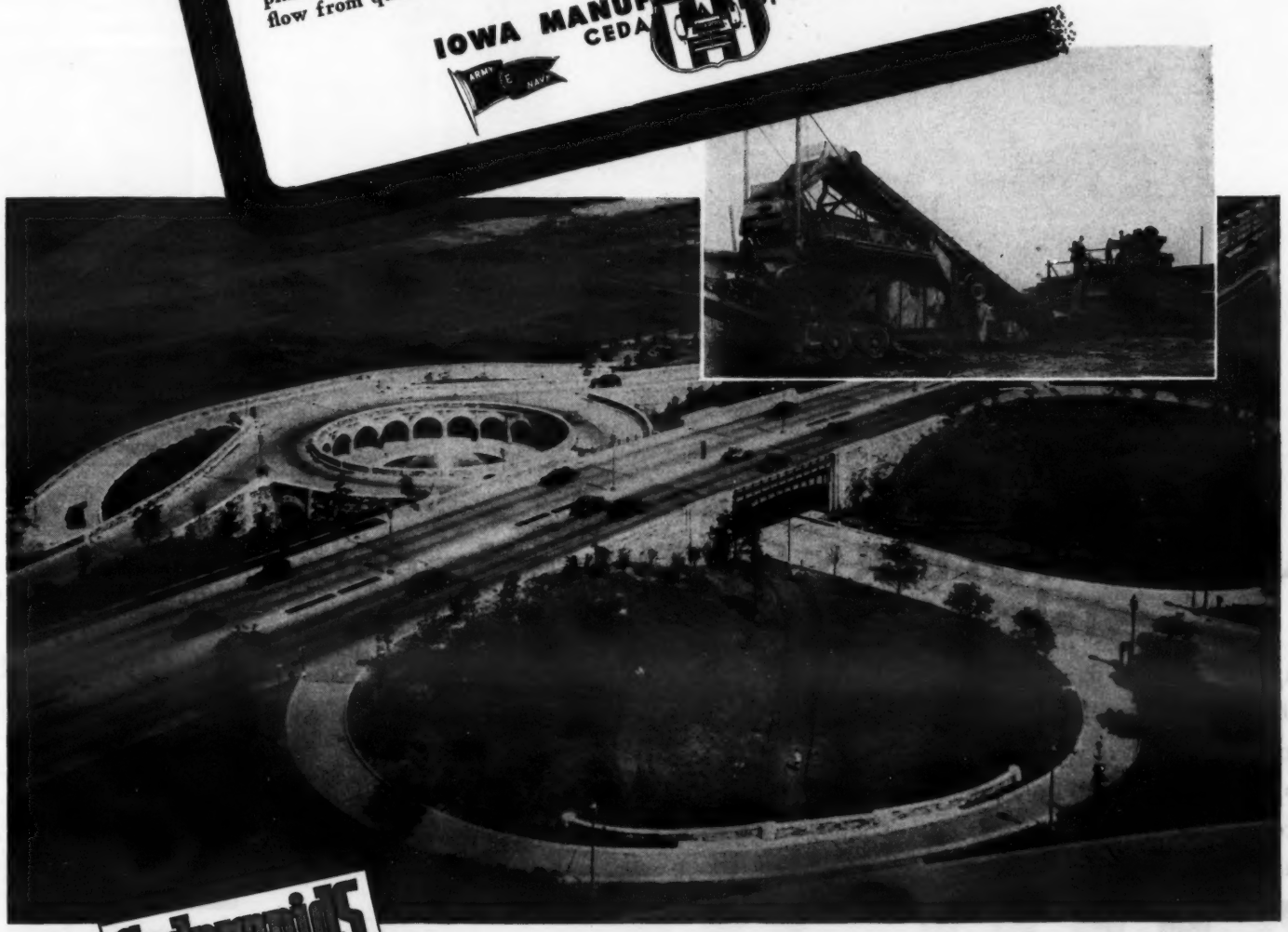
BUILD BETTER *Superhighways*

High cost of materials no longer is a vital factor influencing the construction of the superhighways that will keep the nation's roads far ahead of traffic needs. Iowa has developed a complete line of equipment that achieves large volume production at lowest possible cost by skillfully taking advantage of all the factors influencing maximum and uniform production.

The Cedarapids Morok plant, for example, is an all-portable, super quarry crushing plant that handles material in a continuous flow from quarried rock to delivery trucks in one operation. The big primary will take any rock that will pass through the bottom of a 1¼-yard shovel. Production averages 150 to 200 tons of crushed rock per hour. The plant can be easily moved to and from quarry locations as jobs change. Your only competition will be another Morok owner.

If your aggregate producing or asphalt mixing equipment is not ready for coming postwar construction jobs, now is the time for you to improve your bidding position for production and profits. We invite you to investigate Cedarapids equipment.

IOWA MANUFACTURING COMPANY
CEDAR RAPIDS, IOWA



Cedarapids — Built by IOWA

THE IOWA LINE *of Material Handling Equipment Includes*

ROCK AND GRAVEL CRUSHERS
BELT CONVEYORS—STEEL BINS
VIBRATOR AND REVOLVING SCREENS

BUCKET ELEVATORS
STRAIGHT LINE ROCK AND GRAVEL PLANTS
FEEDERS — TRAPS

PORTABLE POWER CONVEYORS
PORTABLE GRAVEL PLANTS
REDUCTION CRUSHERS
BATCH TYPE ASPHALT PLANTS
TRAVELING (ROAD MIX) PLANTS

PORTABLE STONE PLANTS
DRAG SCRAPER TANKS
WASHING PLANTS
TRACTOR-CRUSHER PLANTS
STEEL TRUCKS AND TRAILERS
KUBIT IMPACT BREAKERS

Old Ill.-Mich. Canal For Express Highway

Many advantages are claimed for the conversion of a portion of the old Illinois and Michigan Canal to an express highway southwesterly from Chicago. This canal was completed in 1848, following a Federal land grant in 1822, and is 84 miles long, varying in width from 40 to 120 feet. The original Federal grant also included a 90-foot strip of land on each side of the waterway which would provide a highway right-of-way of more than 200 feet. It is reported that a four-lane expressway with opposing streams of traffic divided by a parkway would cost approximately $1,100,000 for 2 miles in Cook County, according to plans and estimates made by the County about ten years ago. The cost of developing the canal location right-of-way and construction would be approximately one-half the cost of developing the same type of expressway at other than the canal location.

Another by-product of the construction of this highway would be the elimination of the canal as a prolific mosquito-breeding ground. At present, according to J. Lyell Clarke, Sanitary Engineer for the Des Plaines Valley Mosquito Abatement District, "this 80-foot-wide scum-covered canal, which extends for miles through a densely populated area, has been a potential source of malaria for some time". The conversion of this health hazard into an expressway would not only provide much needed, economical transportation facilities for the area, but would also protect the health and lives of people in ten nearby suburban villages from possible ravages by malaria-carrying mosquitos in post-war years.

P&H Appoints Agent For Western New York

The Harnischfeger Corp., Milwaukee, Wis., has appointed the Wheeler Equipment Co., of 242 Hopkins St., Buffalo, N. Y., to distribute the P&H excavator line in upper western New York state. The territory covers the following eleven counties: Niagara, Erie, Orleans, Genesee, Wyoming, Monroe, Livingston, Wayne, Ontario, Yates, and Steuben.

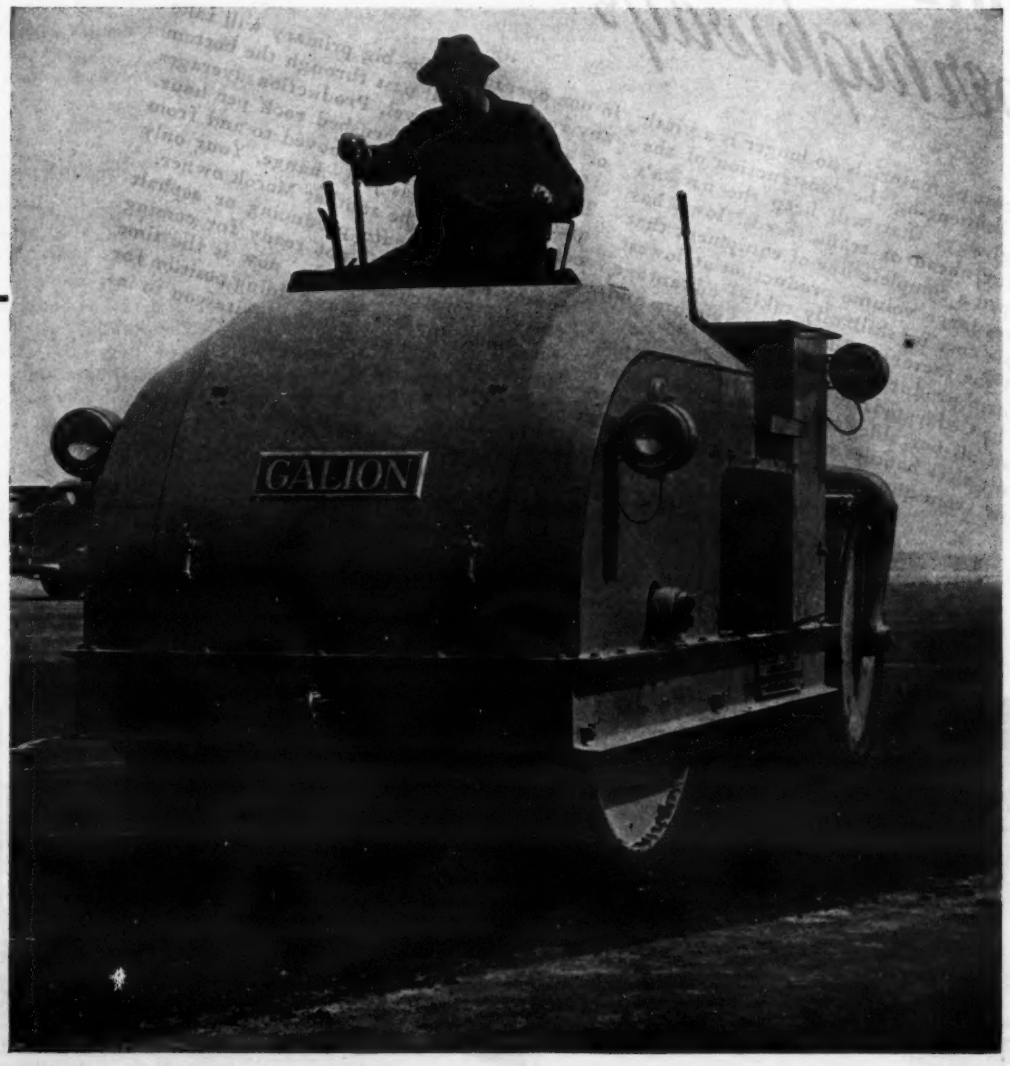
The new representative is handling all P&H shovels from ⅜ to 1½-cubic-yard capacity, including crawler cranes, clamshells, draglines, and truck cranes. It will also service such P&H machines operating in the area.

L. M. Wheeler is owner of the agency and R. G. Fox is his associate.

More "E" Renewals

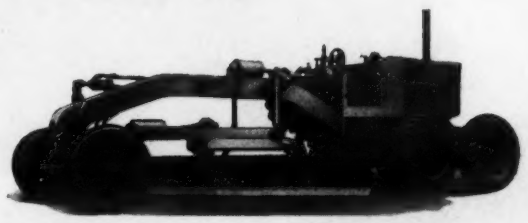
Among the companies recently receiving renewals of their Army-Navy "E" Awards is the Mall Tool Co., Chicago, Ill. This company has been granted its third renewal for maintaining its high production record of drills, saws, grinders and surfacers, and similar equipment.

Employees of Skilsaw, Inc., Chicago, manufacturer of portable electric tools, have also received a third renewal, adding a third white star to the company's "E" pennant.



TANDEM ROLLERS for Those Smooth Take-offs and Landings

Playing an important part in the present war . . . rolling runways, aprons and taxiways . . . Galion tandem rollers will continue to provide precision compaction of material in airport construction in the postwar era. They are built to stand up in day after day service.



Galion No. 101 motor grader

1907

GALION

THE GALION IRON WORKS & MFG. CO.

Main Office and Works: Galion, Ohio

1945

A few of the Jobs

SYNTRON

ELECTRIC HAMMERS

can do for You!

Chipping and Cutting Concrete

Vibrating Concrete Forms

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Removing Mortar for Waterproofing

Quickly—Easily—Economically

3600 powerful blows per minute from ordinary 110 volt A.C. lighting current.

SYNTRON CO.

227 Lexington Ave., HOMER CITY, PA.

THE EDITORS OF

CONTRACTORS and ENGINEERS MONTHLY

Recommend

THE AMERICAN RED CROSS

GIVE

AMERICA is noted as a nation of people who practice the principles of the Good Samaritan, whether the practice be exercised at an earthquake in Japan, among starving Greeks and Armenians, within the areas covered by the rolling flood waters of the Mississippi, the fires of Chicago or Cleveland, or in the wreckage of Eastern tornado and tidal wave. When disaster threatens, Americans rush aid to foreign soil, ministering to an enemy as quickly as to a friend. Regardless of the prefixes or roots or syllables to which we attach the suffix *phobe*, we forget personal opinion, and apply the old American traditional admonition, "Aw, give the guy a break." And the American Red Cross delivers that "break" to every spot where waters lap and winds whisper. The 1945 drive is to be held during March. Let's boost America's best-organized charitable enterprise.

Eutectic Welding Alloys Names Field Engineers

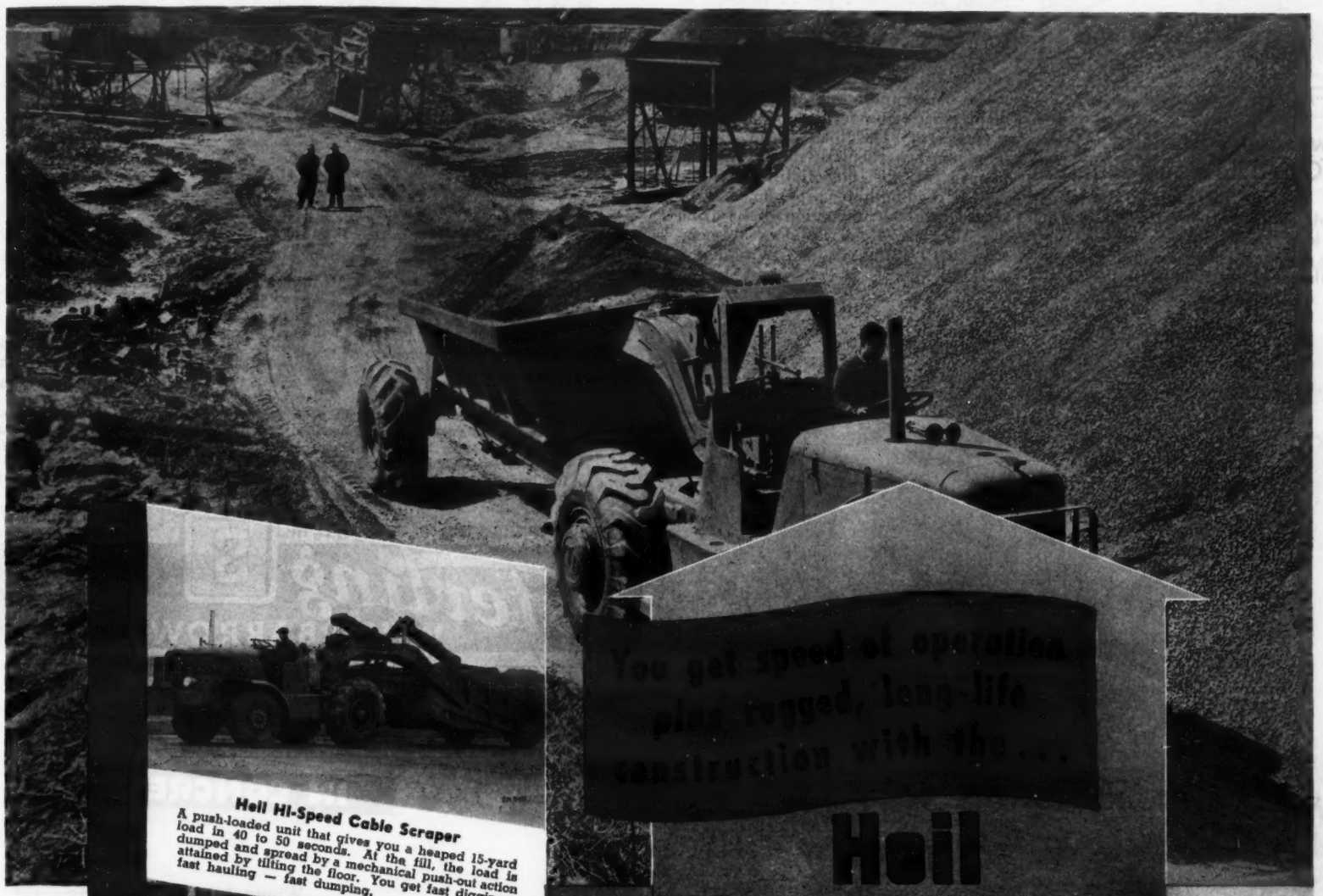
C. F. Patterson and John A. Owen have joined the field engineering staff of the Eutectic Welding Alloys Co., New York City, the former to cover the state of Michigan and the latter to serve in North Carolina. Before joining the Eutectic staff, Mr. Patterson had been associated with the Murray Corp. for eighteen years. Mr. Owen is a veteran welder, having operated his own welding and machine shop for twenty-eight years.

Walker Now Manages Mack N. Y. Division

The appointment of Willard Walker, Vice President of Mack-International Motor Truck Corp., New York City, to the managerial post of the Greater New York Division has been announced. For the past five years, Mr. Walker has been head of Mack's Government Department. He has been Division Bus Manager for Mack in the South, and later was associated with the firm's home office in New York City in a variety of executive capacities. As Vice President in Charge of Sales and Service of the Greater New York Division, he will make his headquarters at 625 W. 42nd St., New York.

Crane Under-Carriage For Special Services

A new 8-page bulletin, C-7-44, has recently been issued by Six Wheels, Inc., 1550-84 E. 20th St., Los Angeles 11, Calif., featuring Maxf-engineered one-man crane under-carriages in three-axle jobs, two-axle jobs, and for special conversion. Copies of this bulletin will be sent promptly on request.



Heil Hi-Speed Cable Scraper
A push-loaded unit that gives you a heaped 15-yard load in 40 to 50 seconds. At the fill, the load is dumped and spread by a mechanical push-out action attained by tilting the floor. You get fast digging—fast hauling — fast dumping.

Heil Cable-Operated Trailbuilder
A ruggedly constructed 'dozer that is easily adjusted for an extra deep bite — whether in soft dirt or hard-packed clay. You get full vision ahead, fast cable control, smooth action that is easy on the tractor, and many other quality features.

Heil Hydraulic Bulldozer
From full-floating blade action to extreme height for throwing, these units give you extra versatility for a wide variety of jobs. Leak-proof unit stays in adjustment and needs but a minimum of maintenance.

The clamshell principle of high-clearance, power-opened, cable-controlled doors has made the famous Heil Bottom-Dump Wagon an amazing performer. It travels at speeds up to 27 m.p.h. — drops the load in a flash or spreads it almost like a cable scraper . . . turning at will off the windrow . . . moving over the fill with little or no slackening of speed.

The unit is designed to maintain this performance over a long, useful, trouble-free life. The body is an all-welded steel-plate unit reinforced with sturdy, welded box sections. The big tires, well-distributed load, and easy maneuverability enable you to keep going on soft or rough ground.

You can stay out in front — in reputation and profits — with this modern, fast-operating, good-looking unit. Write for bulletins giving full details on Heil's advanced design or —

See Your Heil Distributor

R-44

THE HEIL CO.
GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

"Probably a Seabees' foxhole."

New ARBA Booklet On "The Road Ahead"

In selecting the title "The Road Ahead" for its newest booklet, the American Road Builders' Association really meant "The Road Job Ahead". The theme of the booklet is that a nation's economic structure rests on its highways. In view of the serious deterioration of our present highway system during the war, and the anticipated needs for more and better highways in the future, the road job ahead is enormous, but in carrying it on there will be jobs and prosperity, sound opportunity and economic stability.

The first part of the booklet is devoted to how construction creates jobs, and, by means of text, illustrations and diagrams, shows the types of indirect as well as direct jobs resulting from an active road-building program. Since only "big plans" can meet the needs, the next subject discussed is the highway requirements of the future and the importance of preparing now to meet them.

Copies of "The Road Ahead", which is planned particularly to inform the layman of the potentialities of the needed road-building program, may be secured without obligation direct from the American Road Builders' Association, 1319 F St., N. W., Washington 4, D. C.

Bucyrus-Erie Booklet

A particularly well-illustrated 36-page book has been issued by Bucyrus-Erie Co., South Milwaukee, Wis., under the title "In War and Peace Progress Starts with Excavation". This book has been prepared in appreciation of the men, both in the armed forces and civilians, whose job in helping win this war has been the direction and operation of Bucyrus-Erie tractor equipment.

The book shows some of the things tractor-equipment users may expect from this manufacturer after the war when thousands of men who have used this type of equipment return to civilian life. Copies will be sent promptly on request.

Any Way You Look at 'em . . .
STERLINGS EXCEL!

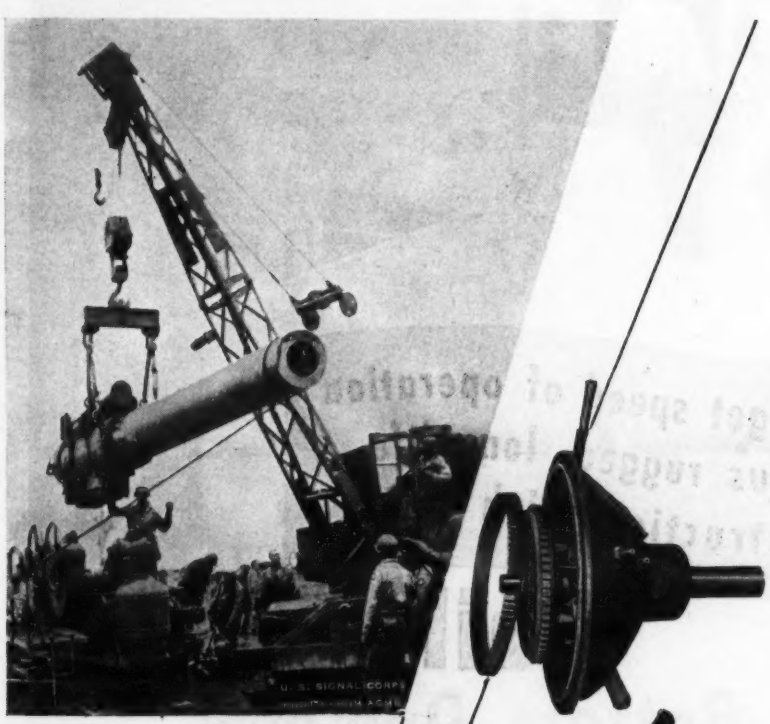
Your Post War Plans Should Call for High Quality Wheelbarrows

Carefully examine every detail of a Sterling Wheelbarrow — tray, braces, wheel, wheel guard, legs and handles. You'll find that Sterlings are engineered and built to take hard punishment over a long period of years. Right now, 100% of our facilities is devoted to essential war production. But we are looking forward to the postwar era when we can again take care of your normal barrow requirements.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Look for this Mark of STERLING Quality

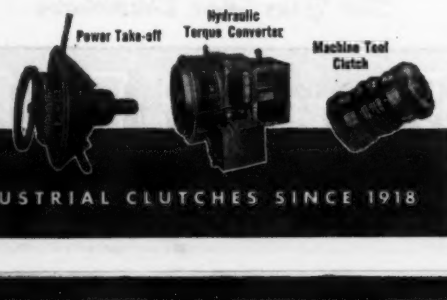
Sterling WHEELBARROWS



Double Speed-up

Twin Disc Power Take-offs—clutch power take-off units complete with shafts and bearings mounted in rigid cast iron housings—fit standard S.A.E. housing sizes from S.A.E. 6 to No. 00. Rigidly maintained tolerances at every point in production eliminate any necessity of fitting parts during assembly . . . a definite time-saving. This not only speeds up the assembly line but is a distinct advantage when post-sale service becomes necessary. Thus, when you specify Twin Disc *Standard* Power Take-offs, you not only speed up your assembly, but you take full advantage of the *standard* parts stocks maintained by the Twin Disc Clutch Company in 37 industrial centers in the United States and Canada to speed up field service . . . prevent work interruptions or delays in transportation of vitally needed replacement parts. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

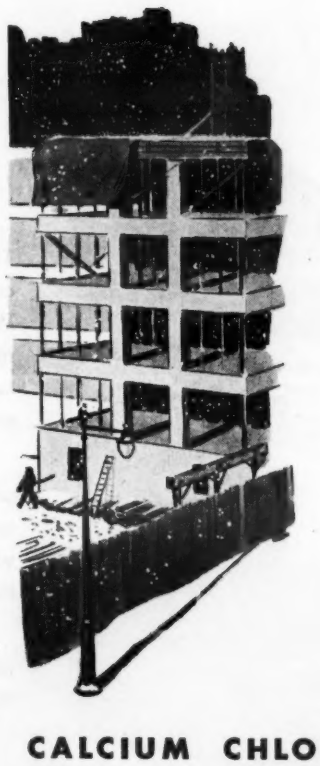
Photo above was taken on Italian front; shows Thew Moto-Crane equipped with Twin Disc Power Take-off lowering a 240 mm. howitzer into position.



TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

Stop WINTER LAG* IN CONCRETE



Winter Lag* is the progressively slower action of concrete in acquiring strength as the thermometer goes down.

Much of this Winter Lag* in concrete can be overcome by using calcium chloride in-the-mix. For instance, concrete containing 2% calcium chloride, exposed to 40° temperature, will acquire safe strength in practically the same time that plain concrete does at 70°. Used with other normal protection, concrete can be placed on favorable schedules all the year 'round. This is the least expensive as well as the most effective means of speeding up cold weather concrete schedules.

Besides the high early strength induced by calcium chloride you get built-in curing — automatic curing at no extra cost and you get higher strength *at all ages.*

Ask for our Bulletin 28, "Early Strength Concrete."

CALCIUM CHLORIDE ASSOCIATION
4145 Penobscot Building • Detroit 26, Michigan

CALCIUM CHLORIDE
SPEEDS WINTER CONCRETE CONSTRUCTION

Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Hardpan Fell Within "Rock" Excavation Clause

If the framer of a specification as to what should constitute "rock" excavation, within the meaning of a state highway contract, thought that he was making it so clear that his definition would be litigation-proof, he fell down. Here is the specification:

"Rock excavation shall include all hard, solid rock in ledges, bedded deposits and unstratified masses and all conglomerate deposits so firmly cemented as to present all the characteristics of solid rock; which material is so hard or so firmly cemented that in the opinion of the engineer it is not practicable to excavate and remove same with a power shovel except after thorough and continuous drilling and blasting."

The specification specially excluded "old plain or bituminous-bound bases or surface courses of macadam, gravel, broken stone or shale, and such materials shall be classified as common excavation." The clause further declared that a "power shovel", within the meaning of the specification, should be deemed to be a modern one of at least ¾-cubic-yard rated capacity, possessing adequate power and being in good running condition in the hands of an experienced operator.

The specification was considered by the Wisconsin Supreme Court in the case of State v. Smith, 299 N. W. 43. The court directed defendant, State Treasurer, to pay an order issued by the State Highway Commission on a semi-final estimate on the job. The estimate was based upon the highway engineer's classification of hardpan as being "rock excavation," within the meaning of the above quoted specifications. The State Treasurer questioned the power of the engineer to make that classification, but the Supreme Court upheld it as being a reasonable exercise of the engineer's discretionary powers, there being nothing to show that he acted fraudulently.

Deadlines for Filing Contractor Lien Claims

It should be borne in mind that statutory time limits within which contractors must file lien claims are not very elastic. Light on this point is cast by the decision rendered by the Kentucky Court of Appeals in the case of City of Ashland v. Ben Williamson & Co., 294 Ky. 446, 171 S. W. 2d, 968.

The court ruled that a Kentucky statute which gives liens in favor of those furnishing labor or materials for the construction of "public improvements" covered a contract for materials to improve a municipal water system.

Other questions presented to the court were whether or not certain lien claims had been filed within the required time—thirty-five days after completion of the work for which liens were asserted. In line with what courts throughout the country generally hold, the Court of Appeals decided that, although the contract job in this case was first considered as having been completed December 30, the time for filing a lien claim ran from the time in late January when certain items of work which had been overlooked, but *which were required by the contract as part of a complete job*, were furnished.

But the court decided that work done by a contractor after completion of a job, in compliance with a guaranty to make defects good for a stated time, or to remedy damage done by subsequent casualty, would not extend the time for filing a lien claim.

The court reaffirmed the well settled rule that things done after actual completion of a contract for the sole purpose of extending the time for filing a lien will not be permitted to accomplish that end.

Buying "As Is" Equipment

Commercial usage has never produced a briefer or more-to-the-point sales term than "as is". It automatically carries the implied warning, "Let the buyer beware".

A steam shovel more than old enough to vote had not been used for many years when it was sold as scrap metal for $75. The purchaser, in turn, agreed to sell it "as is" for $225. In litigation that followed between the second and first purchaser over the condition of the shovel, the New Hampshire Supreme Court decided (Johnson v. Waisman Bros., 36 Atl. 2d, 634):

"The mere knowledge on the defendants' part that the plaintiff was purchasing the shovel with the general intention of using it 'on a job' would not charge them with liability to plaintiff for his loss of profits on jobs he secured later, especially since it was clear that the shovel could not be used without undergoing extensive repairs and that whether it could be successfully used for specific work even after being repaired was problematical.

"Furthermore, the plaintiff was not entitled to assume that the shovel would do the work in question [excavation for a building]. The defendant sold it 'as is' and this term, when contained in a memorandum of purchase and sale, means that the seller sells and the purchaser buys the specific chattel in its then existing physical and mechanical condition and without warranty as to quality or fitness for a particular purpose."

False Statements About Ability of Engineers

Usually, libel or slander involves a statement that is prejudicial to one's reputation for morality or integrity. But, as shown by a decision lately handed down by the Texas Commission of Appeals, it is actionable defamation falsely to accuse one of incompetency in his chosen occupation.

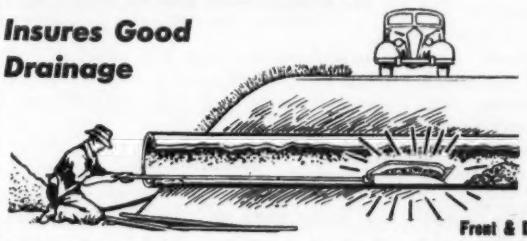
A Texan who disfavored a municipal project complained in a newspaper article that a Board of Commissioners had erred in employing an engineering company "when there is no person connected with the company who is a practical engineer, or who holds a degree of engineering". He also stated that he was reliably informed that "this company has never done any similar work". The Commission of Appeals decided that the accusation was false and actionable. (Bell Publishing Co. v. Garrett Engineering Co., 170 S. W. 2d, 197.) The court applied a widely recognized rule of law that has been thus stated:

"False words which tend to prejudice the person spoken of in his business, profession, office, occupation or employment are actionable without proof of special damage, if they affect him * * * in a manner that may, as a necessary consequence, or does, as a natural consequence, prevent him from deriving that pecuniary reward which, probably, otherwise he might have obtained."

The court ruled that, being false in facts stated, the article in question could not be excused under the rule that one is not liable for reasonable and fair comment upon matters of public concern.

MORCO CULVERT CLEANER

Insures Good Drainage

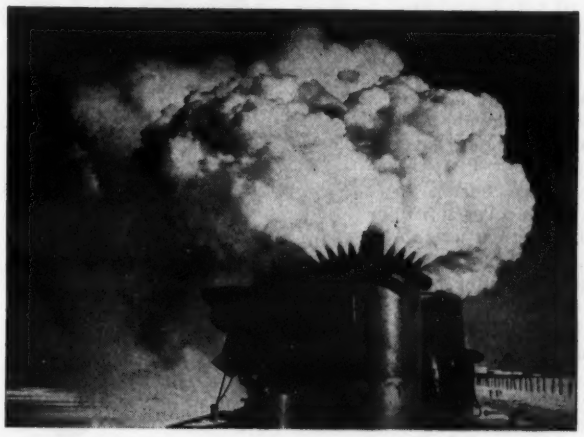


Restore clogged culvert pipes to service with the "Morco" Culvert Cleaner. Quick-acting, non-damaging, easy operating. "Morco" is the most satisfactory tool yet developed for this work.

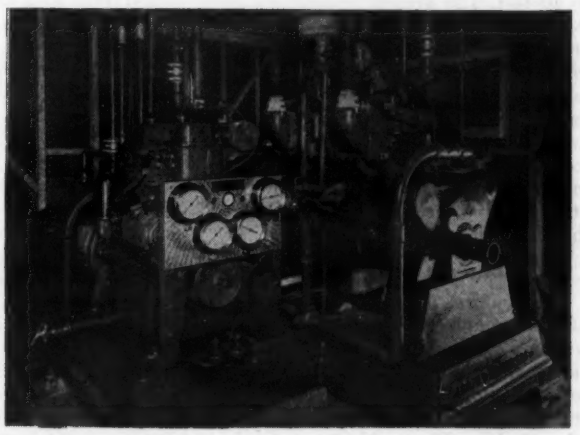
MONARCH ROAD MACHINERY COMPANY

Front & Douglas N. W., Grand Rapids 4, Michigan

TRUSTWORTHY IGNITION *with* WICO *Magnetos*



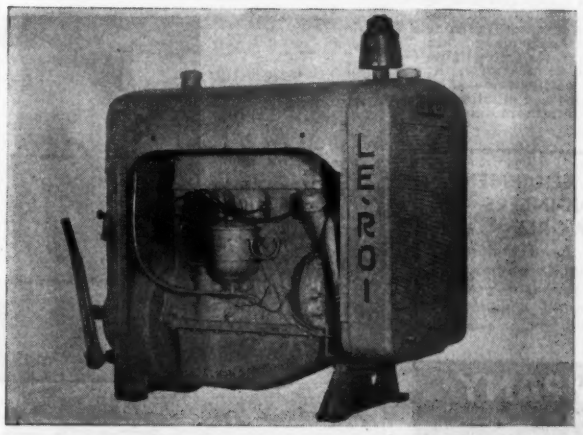
This smoke generator, towed by a truck, lays a smoke screen on land as a destroyer does at sea. Made by The Heil Company, it must, in common with all front-line equipment, be able to take a tremendous beating. One reason why it qualifies for this is its WICO magneto.



Here's a dual Waukesha engine driving a generator that produces power and light for a large super market 24 hours a day. It takes a sturdy engine with every part tested and proven. Among these are its WICO magnetos.

Deere & Company selects a magneto that will live up to the well-earned reputation that John Deere tractors have for dependable, reliable performance. This tractor will do a hundred jobs on a farm, and every part must be rugged. That's why it's equipped with a WICO magneto.

This J. I. Case Company combine does a big tough job under conditions that are hard on the engine. One part that helps make the implement so reliable is its WICO magneto, always ready with a hot strong spark that keeps coming under all conditions.



A manufacturer of industrial engines and power units faces a difficult task today. Performance requirements are the toughest in history. This D140 heavy duty LeRoi engine is demonstrating its ability to produce more horse-power hours per dollar, and partly because it is equipped with a WICO magneto.

WHEREVER reliable, dependable ignition calls for a hot strong spark under tough operating conditions, WICO magnetos do the job. In applications where . . .

1. Other ignition may fail under sudden heavy load
2. Weeks or months of inactivity costs the battery its power
3. Continuous operation requires heavy-duty performance

. . . there's a WICO adapted to the job. Usually it may be installed without engine change, frequently producing both manufacturing and operating economy. Wico Electric Company, West Springfield, Massachusetts.

WICO

Michigan County Widens Old Road

Detroit Highway Widened By Concrete Strips, Old Patches Treated to Prevent Bleeding; Hot-Mix Top

✦ A 1.7-mile section of Seven Mile Road West in the northern quarter of the city of Detroit was recently improved for the Wayne County Road Commission. The project included the widening of the road with a portland-cement-concrete base course, repairing the existing pavement, improving the drainage system, constructing a 2-inch asphaltic-concrete surface, concrete curbs and sidewalks. The contract was awarded to the Frank J. Knight Co. of Center Line, Mich., for $107,000. A subcontract for the asphaltic-concrete surfacing and stabilizing the bituminous patches was let to the Cooke Contracting Co. of Detroit.

The original pavement, built in 1916, was an 8-inch concrete road 18 feet wide. This was subsequently widened in 1926 to 40 feet. The present widening with a 9-inch plain-concrete base course increases the width of the pavement as much as the roadway limits would permit, so that the improved road now varies from 48 to 60 feet in width. The average increase was 14 feet, with a 10-foot strip added to one side of the pavement and a 4-foot strip added to the other. Curbs were built on both sides of the pavement.

Concrete for Widening

A mixer was used for the greater part of the concrete widening strips and truck-mixed concrete was used for the curbs and the sidewalks. The concrete for widening developed a compressive strength of 3,500 pounds per square inch after 28 days. These widening strips have no expansion joints, but contraction joints were placed in line with transverse expansion joints in the existing concrete pavement. The concrete was finished by hand and when these operations were completed the surface of the base course was grooved at right angles to the center line. These grooves were ⅜ inch wide and ⅜ inch deep and were spaced 4 inches center to center. Their function is to keep the asphalt surface course from shoving. The grooves were made by a board, used as a float, around which ⅜-inch iron rods were wrapped at 4-inch intervals.

C. & E. M. Photo
The surface heater used by Cooke Contracting Co. for heating old bituminous patches prior to applying chips to prevent bleeding into the new hot-mix surface.

Resurfacing

The preparation of the old roadway for resurfacing included the rebuilding of 30 catch basins to meet the new grade of the road, and adjusting to grade the castings on 150 drainage and water-main structures. The road was next swept clean with a power broom. The old expansion joints were cleaned out by hand picks to a depth of 1 inch, and previous bituminous patching was treated so that an excess of bitumen would not be present when the new asphalt resurfacing was laid. Otherwise the heat of the new hot-mix would cause the old bitumen to bleed through into the new pavement.

These old patches were heated to soften the bitumen and then covered with a fine layer of stone chips. Heat was applied both by a hand fuel-oil burner and with a surface heater. The latter outfit is a portable unit on two wheels holding two 25-gallon tanks of fuel oil. Hanging from the side is a rectangular metal rack equipped with three burners suspended about 6 inches above the pavement. The heater is light enough to be pulled about by hand. When the patch was softened, a layer of fine stone chips was thrown on with a shovel and the patch was rolled by a Buffalo-Springfield 6-ton tandem roller. A 1½-ton truck accompanied the unit to keep it supplied with fuel oil and stone chips.

The prepared surface was next given a bond coat of emulsified asphalt, AE-2, at the rate of 0.1 gallon per square yard by a pressure distributor. No greater area of bond coat was applied than could be covered with the hot asphalt mix in one day.

A 1-inch-compacted asphaltic binder course was then laid by a mechanical spreader and rolled by two 10-ton tandem rollers. The proportions of material for the binder course were within the following limits:

	Per Cent
Coarse aggregate, passing ¾-inch sieve	100
Coarse aggregate, retained on No. 10 sieve	60 to 80
Sand, passing No. 10 sieve	15 to 35
Bitumen, 85 to 100-penetration asphalt	4 to 6

The asphaltic-concrete surface course was also 1 inch in thickness after compaction by rolling and the proportions were as follows:

	Per Cent
Passing ⅜-inch square sieve	100
Passing 10-mesh sieve	55 to 70
Passing 40-mesh sieve	30 to 50
Passing 200-mesh sieve	7 to 10
Bitumen, 85 to 100-penetraton asphalt	6.5 to 8.5

Major Quantities and Personnel

The major quantities included:

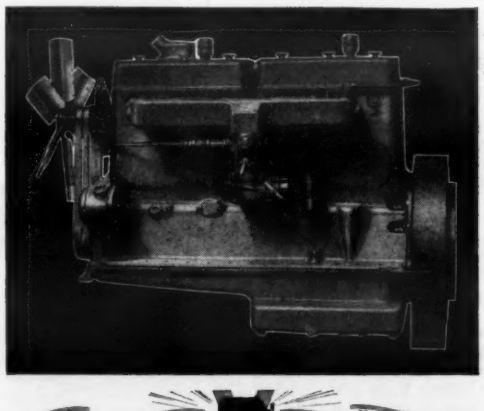
Plain-concrete base course, 9-inch	12,731 sq. yds.
Concrete curb	16,103 lin. ft.
Concrete sidewalk, 4-inch	19,632 sq. ft.
Bituminous bond coat	5,775 gals.
Asphaltic-concrete binder course	3,321 tons
Asphaltic-concrete surface course	4,187 tons

Don Kennedy was Superintendent for Frank J. Knight Co., of Center Line, Mich., on this $107,000 contract. Leroy C. Smith is County Highway Engineer for the Wayne County Road Commissioners, with John K. Norton, Engineer of Highways. George Burr was Resident Engineer in charge of construction on this project, and Earl Sockow, Inspector.

NO!
...not with
WAUKESHA POWER BEHIND THE PLOW

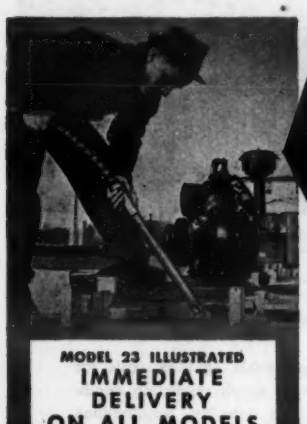
Neither snow in big drifts ten or twelve feet high, nor packed down almost rock-hard, can stop a Snow King Rotary Plow from clearing the highways. With its Waukesha Super Duty Six it's powered to push right through—cutting a clean, full-width swath—shooting the snow in a steady stream to either side of the road. Why do the plow makers, Imperial Machine Co., Minneapolis, use this Model 6-WAK Waukesha Engine? Because it has every modern design and construction feature . . . for maximum power and easier, more economical maintenance. Burns gasoline or butane. Six cylinders, 6¼ in. bore, 6½ in. stroke, 1197 cu. in. displacement. It's *the* engine for the super trucks and buses, oil field machinery, pumps, generators and other mobile industrial equipment of tomorrow. Get Bulletin 1138.

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS. • NEW YORK • TULSA • LOS ANGELES



MORE POWER FOR VICTORY

WAUKESHA ENGINES



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IMMEDIATE DELIVERY ON ALL MODELS

10 REASONS WHY MASTER VIBRATORS PLACE CONCRETE FASTER..BETTER ON ANY JOB!

Master Gas or Electric High Speed Concrete Vibrators are built for high frequency vibration and maintain constant speed under full load to make possible: (1) low cost, high strength concrete; (2) better bond to steel or successive layers; (3) greater density and uniformity; (4) reduced shrinkage and cracking; (5) minimum absorption, greater water tightness; (6) improved compression and flexural strength; (7) drier and leaner mixtures; (8) earlier removal of forms; (9) placing in difficult positions and elimination of hand tamping and spading; (10) minimum finishing and patching, etc.

WRITE TODAY FOR COMPLETE DETAILS

There are Medium Duty, All Purpose or Heavy Duty Master High Frequency Constant Speed Vibrators in Gas or Electric Models to meet every need . . . together with a complete line of Concrete Surfacing Attachments and High Speed Tools. Write for Bulletin No. 528.

ACCEPTED AS STANDARD EQUIPMENT BY CONTRACTORS & ENGINEERS THROUGHOUT THE WORLD

Master High Frequency Constant Speed Concrete Vibrators are no experiment. *They have been proved on every type of construction job for many years. Even under the most adverse operating conditions they provide constant operation over long periods of time.*

MASTER VIBRATOR COMPANY
Dayton 1, Ohio • Distributors throughout United States and Canada
Products Include: Concrete Vibrators, Gas or Electric Surfacing Attachments, High Speed Tools • Vibratory Concrete Finishing Screeds • Rotary Concrete Floor Finishing Machines • Portable Gas Electric Generator Plants, 500 Watt to 17000 Watt, Voltage Regulators and Portable Mountings Optional • Master Flood and Shovel Lights • Electric or Gas Engine Driven Power Rock Hammers

Runways Improved At Army Airfield

(*Continued from page* 30)

practice which increased production was the use of two pugmill operators who alternated each 30 minutes, thus keeping a freshly rested man on this potential bottleneck at all times. The usual plant crew consisted of the following:

1 crane operator
1 cold-gate operator
1 picker, on the cold belt
1 bin spotter
1 oiler
1 drier operator
1 material checker
1 scale man (truck scale)
2 firemen (day and night)
2 utility men
2 pugmill operators

Average production was 1,150 tons for a seven-day week.

The high mineral content of the water available for boiler feed introduced complications in the operation of the asphalt plant, as it was necessary to alternate the use of the two 70-hp Kewanee boilers, each being used for three days, then cooled and thoroughly cleaned. According to C. A. Chipley, Plant Superintendent, Algor 4760 water softener was used at the rate of one pint per 1,000 gallons. A 5,000-gallon feed-water tank was provided and its contents treated with the compound which was first mixed in buckets with live steam and the mixture of five pints of compound and water transferred to the storage tank. Normal operation evaporated about 30,000 gallons daily and even after the use of the water-softening compound it was necessary to clean the boiler completely after each three days while its twin was in use.

Priming and Laying

Prior to placing the asphaltic-concrete surface, a prime coat of 0.27 gallon of MC-1 per square yard was applied to the base course by a 1,500-gallon Etnyre distributor, mounted on an International truck, and fed by two booster trucks of 2,200-gallon capacity. This prime was allowed to cure for a minimum of two days before placing the surface course.

The 2-inch asphaltic-concrete surface was placed by two Adnun Black Top Pavers at an average temperature of 250 degrees. The two machines were run in adjacent 10-foot lanes, averaging 1,200 feet in length, with one slightly behind the other. An operator and three men working with each paver were able to handle the plant output. Buffalo-Springfield tandem rollers, two 10-ton and one 8-ton, were used for rolling the surface which was laid at an average of 10,600 square yards per day.

After the surface course had been open to traffic for ten days, it was swept by a Grace rotary broom and sealed by an application of 0.3 gallon of either RC-2 cut-back or 150 to 200-penetration asphaltic cement per square yard. The asphalt was heated at the cars by two Grace tank-car heaters and transferred to the distributor by two booster tank trucks. The RC-2 was applied at a temperature of 170 degrees and the 150-200 asphalt at 310 degrees and immediately covered by 18 pounds per square yard of minus ¼-inch chips, hauled from the Reeves plant at Roswell and placed by two Buckeye spreader boxes without intermediate handling. Progress on the sealing operation averaged 60,000 square yards per 10-hour day.

Auxiliary Contract

During the time this construction was under way, a contract was also awarded to The Skousen Construction Co., Albuquerque, N. M., for the installation of additional storm sewers with drop inlets and the grading of depressions and ditches for improved surface drainage.

Scarifying of the existing surface was done by a LeTourneau ripper pulled by a Caterpillar D8. After being loosened, the material was placed in stockpiles by bulldozers and 8 and 12-cubic-yard Carryalls. It was then loaded into trucks by a 1¼-cubic-yard Bucyrus-Erie shovel for transfer to abandoned borrow pits on the reservation. Final shaping of slopes was done by bulldozers and two Caterpillar No. 11 motor graders, and compaction was obtained by sheepsfoot and rubber-tire rollers. A dust-palliative treatment was later placed by the same equipment used for sealing.

Storm-sewer extensions to the original system of 72-inch mains consisted of 3,000 linear feet of tongue-and-groove concrete pipe from 12 to 30 inches in diameter laid in trenches 4 to 12 feet deep. Pipe from the Tellyer Pipe Co. of Albuquerque was trucked to the bank of the trenches, which had been cut by a Cleveland 110 wheel-type ditcher. Pipe was laid by hand with mortar joints and backfilled by hand. The first foot of backfill was tamped by air tools powered by an Ingersoll-Rand compressor and above that point it was rolled in 8-inch layers by a small sheepsfoot roller pulled by a Farmall tractor on top of the bank.

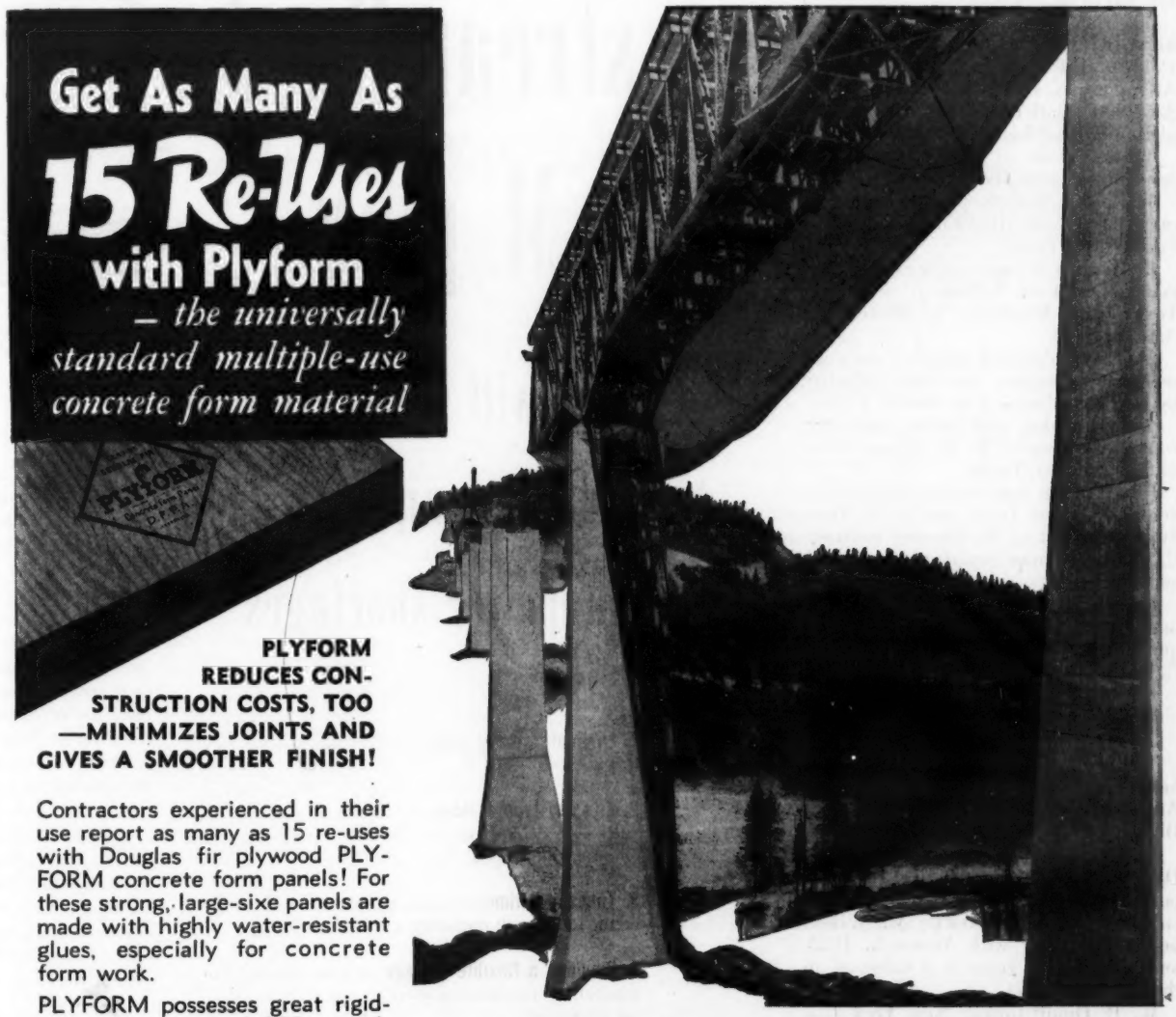
Concrete for drop inlets was mixed in a 2-bag mixer set up at a central location, with its output delivered to the point of use in steel-bodied dump trucks.

Major Quantities

Under the first contract, awarded to Ernest Loyd Construction Co., were in-

(*Concluded on next page*)

YOU'LL COMPLETE CONTRACTS IN RECORD TIME BY USING—
HOBART Simplified Arc Welders
Contractors the country over have found Hobart Gasoline Driven Arc Welders one of the most valuable pieces of equipment to have on a construction job. Not for any one particular job like most construction equipment, but for many varied uses such as metal fabrication and maintenance of other tools and equipment, thus preventing costly delays.
HOBART WELDING ELECTRODES are available for all construction applications. Thoroughly tested and quality controlled to meet rigid specifications.
HOBART BROS. COMPANY, BOX CE-35, TROY, OHIO
FREE! Welder's Vest Pocket Guide Write for yours
A BOOK FULL of IDEAS you can turn into money. Over 100 practical welding applications tried and proven in various industries. Only $3.50
Sample pages sent FREE on request!
"One of the World's Largest Builders of Arc Welders"


Get As Many As
15 Re-Uses
with Plyform
— the universally standard multiple-use concrete form material
PLYFORM
PLYFORM REDUCES CONSTRUCTION COSTS, TOO —MINIMIZES JOINTS AND GIVES A SMOOTHER FINISH!
Contractors experienced in their use report as many as 15 re-uses with Douglas fir plywood PLYFORM concrete form panels! For these strong, large-size panels are made with highly water-resistant glues, especially for concrete form work.
PLYFORM possesses great rigidity, too. A load of 500 pounds per square foot on a ⅝" panel, with joists 12" apart, deflects less than 4/1000 of an inch.
Both faces of a Plyform panel are sanded to a satiny smoothness. This, together with the large panel size, means smoother concrete surfaces with a minimum of joints—reducing rubbing and finishing time. Construction costs, too, are reduced because the standard PLYFORM panels cover 32 square feet per unit, yet are so light in weight that one man can easily handle them.
Write for an interesting free booklet "Concrete Forms of Douglas Fir Plywood", containing complete technical and engineering data. Douglas fir plywood engineers will be glad to assist you in solving any special problems relating to the use of this proven form material.
The McMillan truss-type Bridge in Washington was formed against strong, rigid PLYFORM panels.
The smooth, interesting effects on the Natchez, Miss., bridge approach were made possible by durable PLYFORM.
Douglas fir plywood PLYFORM panels are "Grade trademarked" with the diamond-shaped stamp shown. Every panel also has a distinctive green edge-sealing. All panels are oiled and edge-sealed at the mill unless otherwise specified.
GENUINE DOUGLAS FIR PLYFORM Concrete Form Panel D.F.P.A. INSPECTED
NOTE: In special cases where an absorptive form liner may be required (as in the spillway apron on a dam) PLYFORM is the ideal form backing — rigid, strong, smooth. And the panels may be re-used many times, even after the absorptive liner has been discarded.
Douglas Fir Plywood Association Tacoma 2, Wash.

Runways Improved At Army Airfield

(*Continued from preceding page*)

cluded the following:

Grading	600,000 cu. yds.
Subgrade preparation	1,488,000 sq. yds.
Selected material	300,000 cu. yds.
Base course	300,000 cu. yds.
Asphaltic concrete, 2-inch	160,000 tons
Seal coat	500,000 gals.
Seal-coat aggregate	10,000 cu. yds.

The Skousen contract included the following items:

Grading in drainage depressions	360,000 sq. yds.
Grading in drainage ditches	30,000 cu. yds.
Grading, general	55,000 cu. yds.
Surface preparation for dust palliative	360,000 sq. yds.
Reinforced-concrete pipe, 12 to 30-inch	3,000 lin. ft.
Drop inlets	13

Personnel

The original contract for the major revision of runways at the Army Airfield at Roswell, N. M., was awarded by the Albuquerque District, U. S. Engineers, to Ernest Loyd Construction Co., Fort Worth, Texas, on June 25, 1943, on the low bid of $2,804,000.

The smaller contract for drainage and night lighting was awarded January 10, 1944, to The Skousen Construction Co., Albuquerque, N. M., on a low bid of $263,000. Both contracts carried a completion date of June 15, 1944.

Various items of work performed by subcontractors included the following:

1. Grading and compaction of selected material by L. J. Miles Construction Co., Fort Worth, Texas.

2. Hauling of base course and selected material by Fred T. Kelsey, of Denton, Texas, and Winthiser & Beavers, of Artesia, N. M.

3. Furnishing and applying seal coat, seal-coat aggregate, and dust palliative by Ned B. Hoffman, Fort Worth, Texas.

4. Furnishing and laying asphaltic-concrete surface by R. W. Briggs & Co., of San Antonio, Texas.

Fred Burkett was General Superintendent for Ernest Loyd and E. R. Hise, Superintendent on the Skousen contract. C. A. Chipley was Superintendent at the asphalt plant.

For the U. S. Engineers, the work was under the supervision of the Albuquerque District Engineer, Lt. Col. R. E. Cole, C. E., and field assistants.

Armco Promotions

The promotion of several Armco men has recently been announced by The American Rolling Mill Co., Middletown, Ohio.

Murray B. Wilson, former New York District Sales Manager, has been appointed District Sales Manager of Armco's Dayton, Ohio, district. Mr. Wilson began his career with Armco in 1923, and spent eleven years as a salesman in the Detroit district.

W. B. Quail, former New York District Manager of Armco Railroad Sales Co., succeeds Wilson as New York District Manager of Armco Sheet and Strip Sales. Mr. Quail has been connected with Armco for twenty-six years. He was employed by the Forged Steel Wheel Co., of Butler, Pa., when that company was taken over by Armco.

Mitchell G. Duncan, who has been connected with Armco's St. Louis office for the last twelve years, is being transferred to the company's Detroit office as a salesman. He will be replaced by Fred Mayhew.

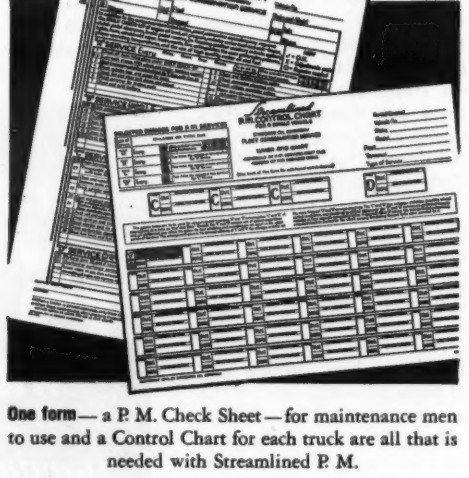
Robert L. Wells, Jr., now a salesman in Armco's Minneapolis office, is being transferred to the Dallas, Texas, office.

Twin Disc Opens Regional Office in Lansing, Mich.

G. M. (Tid) Guilbert has been appointed Manager of a newly opened regional office at 2200 Olds Tower Bldg., Lansing 8, Mich., by the Twin Disc Clutch Co. of Racine, Wis. Mr. Guilbert has been associated with the company for twenty years, and has just completed a nation-wide survey to determine future requirements of equipment for power transmission and control in industrial applications.

A complete engineering service for the Michigan area will be rendered by the new office as soon as present plans are completed.

A new streamlined P. M. plan that will work with today's equipment and manpower shortages



One form—a P. M. Check Sheet—for maintenance men to use and a Control Chart for each truck are all that is needed with Streamlined P. M.

1. Eliminates many forms usually required for record keeping.

2. Fits any type of fleet—bus, passenger car, or truck—on delivery or over-the-road operation—including trailer units.

3. Takes less time of skilled mechanics—only 20% of the P. M. work requiring a skilled mechanic.

4. Provides a flexible mileage or time interval for scheduling maintenance work to suit your individual operation.

● WITH little new equipment in sight and the continued manpower shortage, the need for a sound preventive maintenance plan grows daily.

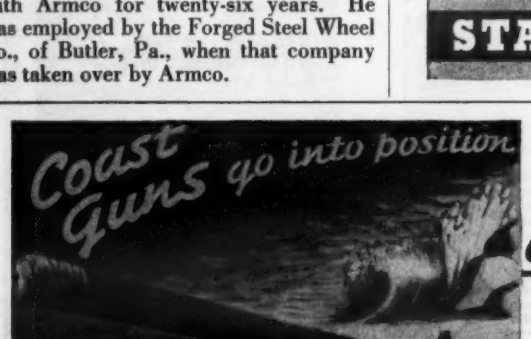
The first objective was to eliminate complicated forms when the Standard Oil Streamlined P. M. Plan was developed. In addition, the Plan was designed to fit any type of fleet operation.

Streamlined P. M. has been tested in a number of fleets, including one of the largest delivery and cross-country operations in the Middle West—our own fleet of passenger cars, delivery, and transport trucks. It has been proved conclusively that the Plan works if it is conscientiously followed. It shortens the time trucks are in the shop. It reduces road failures and cuts maintenance time and costs.

Ask the Standard Oil Representative who calls on you to explain this simplified P. M. Plan. He has a slide film that shows how P. M. works to your advantage. Call the local Standard Oil Company (Indiana) office, or write 910 South Michigan Avenue, Chicago 80, Illinois, for the Representative nearest you.

Buy more War Bonds

STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE



EXPERIENCE builds 'em PERFORMANCE sells 'em

SAFE from Invasion is no idle boast today. The enemy has been driven from the Alaskan outposts and they dare not attack us here!

ROGERS TRAILERS have played a big part in fortifying our coastlines and they are fighting with our men overseas!

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The ROGERS TRAILERS which will be available to industry when present war contracts are completed, will be even better-engineered and more efficient than the thousands which have been operated so successfully for many years.

ROGERS BROS. CORPORATION
ALBION,
PENNA.

Delaware Aqueduct Concrete

In the advertisement of the Noble Co. of Oakland, Calif., in the January issue of CONTRACTORS AND ENGINEERS MONTHLY, the statement was made that "Concrete placed with Press Welds on the Delaware Aqueduct job averaged 5,000 lbs. test strength . . . 2,000 lbs. over the average of concrete placed by other methods." The Noble Co. has informed us that the second figure should have read "20" instead of "2,000".

Uses for Sodding Along Public Roads

In Addition to Controlling Erosion on Slopes and in Gutters and Ditches, Sod Makes for Good Public Relations

By T. H. McCORMICK, Landscape Architect, Division 10, Ohio Department of Highways

IN general, sodding is not being used extensively enough along public highways. Wartime jobs could stand more sod "set up in the plans" to be used at the direction of the engineer. There are few, if any, projects where sod cannot be used somewhere on the job to good advantage. For example, it is important for use around head walls to combat erosion from water run-off.

In Division 10 in Ohio, where steep slopes are the rule rather than the exception, sod is invaluable. It not only gives immediate protection to slopes that are eroding, but also provides a quick, finished, complete appearance to the project. This is especially valuable from a public relations point of view.

At Coolville, on State Route 7, in Athens County, the Ohio Department of Highways constructed a fine brick and concrete pavement. No seeding was done. The slopes through the town eroded badly and property owners were constantly complaining about the unsightly appearance of the slopes in front of their homes. In 1940 a relief project was set up and work began in the autumn. Over 3,000 yards of sod were laid through the town. All slopes were sodded, with sod being placed on flat areas for a distance of one foot in from the curbs and sidewalks. The remainder of the flat areas were seeded. The finished appearance of the slopes, when the job was completed, pleased and satisfied the property owners. Not only was erosion taken care of, but the Highway Department made many friends in Coolville.

Slope Sodding

In connection with slope sodding, flatter slopes should be the rule. Flatter slopes mean slower water run-off, would mean better sodding jobs and easier seeding where necessary. They are also more desirable through towns and villages from the angle of easier mowing for the property owner. In many cases sod has slipped badly, due to the steepness of the slopes. A flatter grade would have made possible a lasting job. Even though staked, sod will slip on steep slopes from cattle getting on the slopes and from children running up and down. In one small town in Division 10, we sodded steep slopes that had an outcropping of rock and shale. No especial preparation was given the slopes. The sod was laid three years ago and is still solid and in good condition, with a good stand of grass. Needless to say, the property owner was, and is, well pleased with the job.

Slope sodding has unlimited possibilities and more of it should be done. It is noted, however, that there is a tendency to overload the sod with water. On the steeper slopes, the weight of the water may cause the sod to slip, when jarred, even though staked.

Gutters and Ditches

Sodded gutters and ditches are money savers, both to the state highway department and to the taxpayer. Not all ditches can be sodded, as much depends upon the size of the ditch and the amount of water carried, as well as the velocity of the water. The average gutter or ditch in Division 10, along the Ohio River in southeastern Ohio, can be sodded and will carry normal water run-off quite satisfactorily. Such treatment is recommended for ditches on rewidening jobs. On one project on State Route 7, a few miles south of Marietta, slabs of concrete were broken out of the existing pavement and new concrete poured. The disturbed areas on the shoulders were seeded but nothing was done about the shallow ditches, except some seeding, which was washed out by rain before the seed had a chance to germinate. Had these ditches been sodded, they would then have been salvaged completely.

Another advantage of sodded gutters and ditches is that the work can be done by the maintenance and repair forces of the department where needed. Some superintendents and maintenance engineers do not fully realize the value of such work and the time and money that can be saved by using sod. If a ditch is sodded and the sod is extended up the slope for a short distance, with seeding and/or vines from the sod to the top of the slopes, a great deal of constant maintenance work can be saved.

Sod is not a cure-all and it has its limitations. At times, the answer is concrete gutters and ditches, but sod should be given a chance to do the job where calculations show that the water run-off from the area is not too great during peak rainfall. One sod gutter which was put in four years ago at the top of a steep slope is still giving good service and doing the job it was intended to do. On another job in Hocking County, a

(*Concluded on page* 61)

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POWER MOWERS
All Over the World
TORO MANUFACTURING CORP'N.
MINNEAPOLIS, MINN.
HEADS UP FOR VICTORY!

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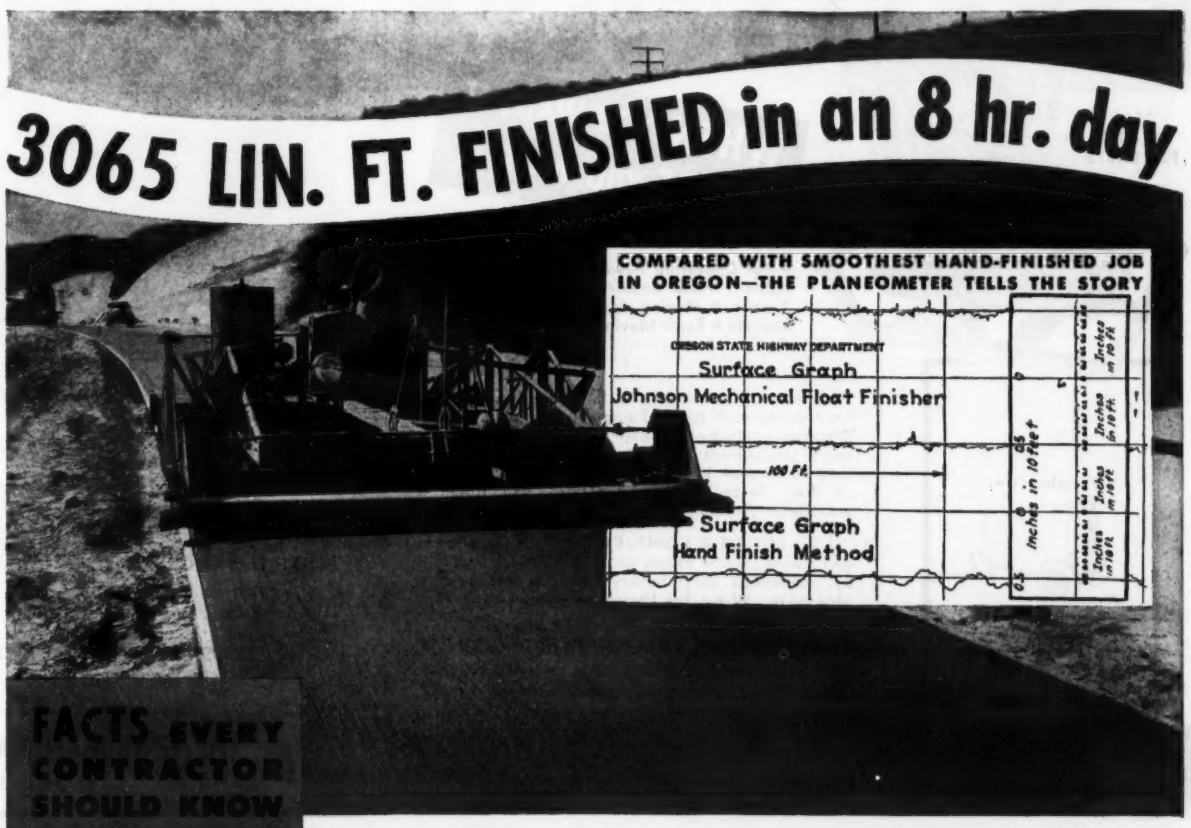
COMPARED WITH SMOOTHEST HAND-FINISHED JOB IN OREGON—THE PLANEOMETER TELLS THE STORY
OREGON STATE HIGHWAY DEPARTMENT
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100 Ft.
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FACTS EVERY CONTRACTOR SHOULD KNOW

The Johnson Float Finisher is efficient on all modern vertical, horizontal and transverse spiral curves.

This finisher makes a smoother, more perfect road surface (see graph).

Has been in use in western states for 7 years.

Keeps up with the largest high-capacity mixers.

Maintains daily production speed – never grows tired.

Equipped with trailer hitch and wheels for short hauls.

Can be dismantled into legal truckload complying with highway regulations.

Write for Catalog

... finished with a Madsen-built JOHNSON FLOAT FINISHER

CONTRACTORS! You can increase the daily production of your paving crew . . . reduce finishing costs by 50% . . . and eliminate the bottleneck of hand float finishing with a Johnson Float Finisher. It reduces the finishing crew to two men for a complete job including edging and jointing on any paving project using a seven-sack paver.

When Roy Houck, Oregon paving contractor, placed 746 cu. yds. of concrete and finished 3065 lin. ft. of pavement in an 8-hour day (383 ft. per hr.), he set a record of production and the Johnson Finisher helped make it possible.

He did not set a record for finishing—the speed of the Johnson Float Finisher is far greater than required under present-day cement concrete production methods.

With the savings in labor and the increased production of the paving crew, the Johnson Float Finisher will pay for itself in 25 miles or less of double-strip highway.

Plan for tomorrow, today! Write for Catalog No. MP-140.

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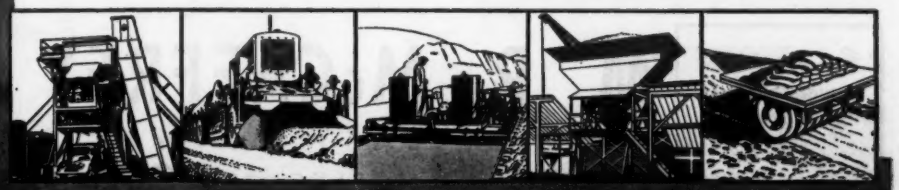
HUNTINGTON PARK, CALIFORNIA

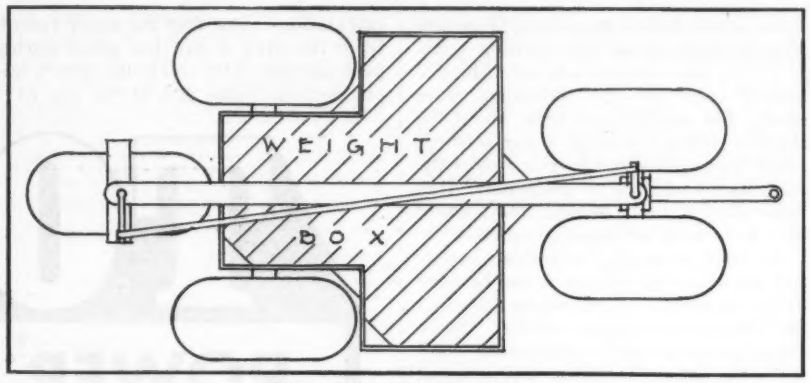


MADSEN ASPHALT PLANTS . ROAD PUGS . CEMENT FINISHERS . BATCHERS . COMPACTORS

New Type of Roller For Smoother Roads

A new type of rubber-tire roller designed to smooth as well as compact all types of stabilized bases, bituminous cold-laid wearing surfaces, and seal-coat aggregates will be ready for post-war sales as soon as wartime restrictions are raised. This Flat-Iron roller has been used in a considerable number of states from New England to the Pacific Coast, on the Alaska Highway, and in the construction of many mid-western airports, according to the Flat-Iron Roller Co., 2336 Hampden Ave., St. Paul 4, Minn.

The Flat-Iron roller consists of five smooth-tread rubber tires so mounted with two forward and three behind, with a T-shaped weight box between, that they compact and smooth previously mixed material with the least possible disturbance of the mix. The rectangular weight box makes accurate weight calculations easy so that control of pounds per linear inch of roll is possible by either tire air pressure or weight added or both. It has a low center of gravity so that it can be used for compacting shoulders and in inaccessible places without danger of overturning.



Plan of the Flat-Iron roller.

The Flat-Iron roller has ball bearings, can be towed to and from the job at 50 mph, and will work under load at 20 mph. It is easy to repair as the tire on each wheel can be changed without disturbing the others. The wheels do not have to be greased any oftener than the front wheels of a truck. It has a short turning radius, made possible by its only moving parts, except the wheels, synchronizing the rear wheel with the front wheels in turning.

The overall width of the Flat-Iron roller is 84 inches with five 17 x 45 x 16 inch airplane tires; it compacts a path 72 to 75 inches wide; and the weight-box capacity, without sideboards, is 81 cubic feet, permitting a gross loaded weight of 4.5 to 7 tons, giving from 40 to 400 pounds pressure per linear inch of tire.

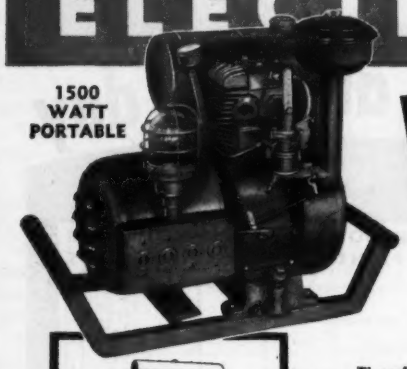
Complete information on this new roller may be secured direct from the manufacturer by mentioning this item.

Cooper-Bessemer Names Vancouver Distributor

Simson-Maxwell, Ltd., of Vancouver, has been appointed by the Cooper-Bessemer Corp., Mount Vernon, Ohio, to distribute its products in British Columbia. The new dealer will handle all vertical diesels, ranging from 200 to 1,900 hp, GAW horizontal stationary diesel engines, and the Type GX3A air starting units.

ELECTRICITY

WHEN YOU WANT IT
WHERE YOU WANT IT



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There's an economical "U. S." unit for every construction-work need. Engineered by men with practical, out-in-the-field experience. Built to take every punishment — and operate faithfully for long continuous hours. Sizes from 500 watts to 15 KW. Skids, rings, porter bars, and trailer mountings available.

"U.S." BUILDS A COMPLETE LINE of Gasoline and Diesel Electric Plants up to 75 KW—for standby, continuous duty, battery-charging, and portable uses. Write for literature, stating type of unit and capacity required.

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QUARRYING
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OIL FIELDS

FLEXIBLE TRACKS
Result In Maximum Traction

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SNOW REMOVAL
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Where grades are steep and snow is deep

BUILT-IN POWER
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DISTRIBUTION

TRACTORS AND TRACK TRAILERS 5 TO 50 TONS CAPACITY

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THE LINN MANUFACTURING CORPORATION
MORRIS, NEW YORK

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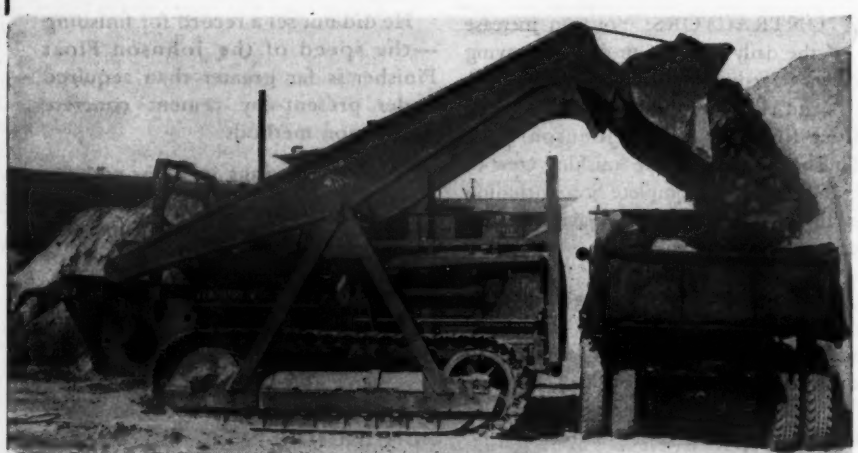

- 1½-yard capacity bucket.
- 100% cable control of bucket.
- Weight centered on truck frame.
- Design permits bucket to reach over center of the truck.

For sizes and specifications of this unit write to:

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LOS ANGELES 11, CALIFORNIA

In the heart of downtown
MILWAUKEE
450 ROOMS OF COMFORT
. . . Friendly hospitality. Coffee Shop, Cocktail lounge, Garage and parking lot. Remember—Milwaukee's BEST BUY!
with bath—from.....$2.75
without bath—from.....$1.65

Owner Operated by the Milwaukee Hotel Wisconsin Co.
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HOTEL WISCONSIN

Sealing Improves Belt-Line Highway

Life Span of Urban Route In Minneapolis Increased By Asphalt-Emulsion Seal Applied by Contract

♦ STATE Highway 100, a north and south road serving as a belt connection for several state and Federal highways on the west side of Minneapolis, was improved last summer by the application of an emulsion seal coat under a contract awarded by the Minnesota Department of Highways to George D. Alexander, Minneapolis, Minn. This highway, varying in width from 30 to 60 feet, with opposing traffic separated on some sections, is surfaced with 150 pounds of bituminous plant-mix per square yard, laid on a selected-gravel base 18 to 24 inches thick with the top 8 inches compacted. It has withstood heavy traffic successfully so that the additional seal coat was the only maintenance required in 1944.

Bituminous Application

Preliminary cleaning of the old surface was done by a shop-built broom pushed ahead of a Chevrolet truck and since this broom could not be adjusted to sweep in either direction, its use was a delaying factor. A Littleford adjustable trailer broom had been ordered but the contractor had been unable to secure its delivery in time for this job.

Bitucote emulsion was shipped in tank cars from the Arkansas plant of Bitucote Products Co. to Robbinsdale, Minn., near the north end of the job where a Cleaver-Brooks tank-car heater raised its temperature to 110 degrees F and transferred it to a 1,220-gallon distributor mounted on an International truck.

The 100 to 300-viscosity emulsion was applied at a temperature of 108 degrees in 12-foot widths at a rate of 0.30 gallon per square yard, starting from one side of the wide highway. Applications 1,600 to 1,800 feet in length were made, using about half of a distributor load, while traffic was diverted to the adjacent lanes by two flagmen stationed near the ends of the application.

Before beginning each shot, a paper strip 3 feet wide was spread at the end of the previous shot, and the application was started with the spray bar over this paper to avoid a gap or overlap where the shots joined.

After the application of the cover chips to the first shot, the remainder of the distributor load was applied, in the same lane, with succeeding distributor loads being applied, half at a time as before, to the adjacent lateral lanes, until the full width of the highway had been sealed.

Because of the traffic congestion and its accompanying delays, application of emulsion averaged only 5,000 gallons per 8-hour day.

Cover Chip Application

For cover chips, No. 20 to ½-inch crushed gravel was hauled in 3½-cubic-yard loads from a commercial plant located near the job. The average haul was 3½ miles, and five Chevrolet trucks with Gar Wood steel dump bodies supplied the cover chips as rapidly as they were needed.

A Buckeye spreader box was attached to the trucks which were then backed down the lane of newly applied emulsion as soon as it started to break, usually 4 to 15 minutes after its application, spreading the chips at an average rate of 21 pounds per square yard.

Since the truck drivers furnished by the local union employment office were unable to keep the spreader box running in a straight line while backing down the road, an extra union truck driver who had experience with that type of driving was imported from St. Cloud, Minn., and substituted, during spreading, for the regular driver who drove the truck to and from the gravel plant. After the load was dumped, the regular driver resumed his place in the truck and returned for another load while the relief driver was substituted for the driver of the next truck to be dumped.

Two men with hand brooms followed behind the truck to remove any inequalities in the spread, and after them the cover chips were rolled by a 5-ton tandem roller.

Major Quantities

The principal bid items were:

Application of bituminous material	78,000 gals.
Furnish and apply mineral aggregate	2,615 cu. yds.
Surface treatment, including rolling and sweeping	277,270 sq. yds.

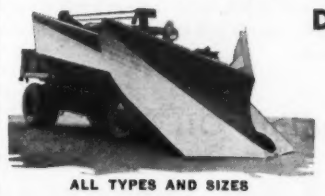
Personnel

The contract for this emulsion seal coat on State Highway 100 in Minneapolis was awarded by the Minnesota Department of Highways on June 6, 1944, to George D. Alexander on his low bid of $13,587. W. J. McKenzie was Superintendent for the contractor, and Egil Wefald, a regular employee of the Construction Department, was temporarily assigned to the Maintenance Department to be Project Engineer on this work. M. J. Hoffmann is Commissioner, O. L. Kipp, Chief Engineer, and C. L. Motl, Maintenance Engineer, of the Minnesota Department of Highways.

Barco Acquires Warsop Hammer and Drill Line

The gasoline-hammer and drill manufacturing business of Warsop Sales, Inc., New York City, has been acquired by the Barco Mfg. Co., of Chicago, Ill., according to a recent announcement. The present Barco line includes portable self-powered models of this type of equipment.

Plan NOW—for NEXT Winter



ALL TYPES AND SIZES

DAVENPORT-FRINK SNO-PLOWS

—should be top choice in your desire for FASTER ● SAFER ● CLEANER Snow Removal. Whatever lies ahead, it's wise to determine your needs promptly and place orders EARLY. We'll cooperate with you in every way. Write us for Complete Information.

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Made in Eastern U.S.A. by CARL H. FRINK. 1000 Islands, CLAYTON, NEW YORK

Sure-footed!

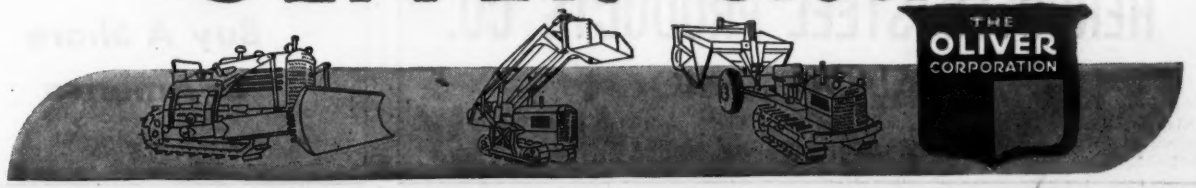
● Downhill or up . . . turns or straightaway, Oliver "Cletrac" crawler tractors have a sure-footed grip. Even when taking a heavy load downhill, they don't zigzag. Power is never disconnected from either track . . . both tracks keep working all the time to assure perfect control, even on turns.

This sure-footed grip, which assures greater safety on hills and turns, is found only on Oliver "Cletracs." For only Oliver "Cletrac" gives you *controlled differential steering* . . . the exclusive feature that eliminates "declutching" or "braking" on turns . . . that enables Oliver "Cletracs" with a heavy load to steer the same going downhill as up. There is no need for the operator to "cross over" on the controls and steer in the opposite direction as is necessary on the ordinary tractor.

These sure-footed tractors are unusually accessible, making maintenance a simple task. They are ruggedly built for long life and greater resistance to the shocks, strains and twists of tractor service.

Substantial numbers of Oliver "Cletrac" tractors are now being released for essential use. Your Cletrac dealer will gladly assist you in making application for a new tractor. • **The OLIVER Corporation,** Industrial Division: 19300 Euclid Avenue, Cleveland, Ohio.

OLIVER - Cletrac



A Few Differentials For Civilian Trucks

While most of the current production of Thornton Automatic-Locking differentials for increasing automotive tractive power is earmarked for military purposes, a portion of the output has been released by the WPB for essential civilian use, according to a recent announcement by the Thornton Tandem Co., 8701 Grinnell Ave., Detroit 13, Mich. This means that they are available to highway departments, contractors engaged on essential construction projects, and similar organizations.

Since the start of the war, it is reported that more than 100,000 of the new G and J series of Thornton differentials have been manufactured for military and essential civilian use. A large number of these have been installed in the rear driving axles of trucks built for the U.S. Marine Corps and the Royal Canadian Air Force. Like their predecessors, the new models prevent a truck from sliding, skidding, and stalling, due to one wheel spinning, and have the added feature of complete interchangeability with the standard conventional differential of various popular makes of trucks. This means that they do not require alteration of the axle shafts or timing of the assembly for proper operation, as was the case with the earlier units.

The differentials are obtainable under WPB Limitation Order Certificate L-158 which requires that the replaced differential be put into service stock, if undamaged and usable. Full information on these requirements, as well as on the models available, may be secured direct from the manufacturer. Just mention this item.

Handling Oil Drums Easily and Safely

The standard 55-gallon steel drum is probably the most widely used in the construction and equipment garage field for diesel fuel and lubricants. Improper handling of these drums can cause many injuries and leakage resulting in hazardous sloppy conditions and wasteful losses.

Falstrom Co., Passaic, N. J., has developed a barrel-lift for standard 55-gallon drums which differs from most ordinary drum-handling tools in that this one-piece two-wheel unit enables one man to raise, transport, and tilt loaded drums.

Complete information on the numerous safety features of this barrel-lift, together with prices, may be secured directly from the manufacturer by mentioning this descriptive text.

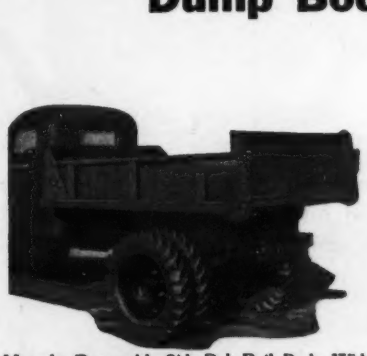
N. J. Plans Elimination Of 55 Road-RR Crossings

Among the post-war construction plans in New Jersey is the elimination of fifty-five railroad-highway grade crossings, at an estimated cost of $16,145,000, according to a recent report of the State Board of Public Utility Commissioners. These proposed separation structures would be in addition to sixteen others previously planned and on which construction was postponed because of shortages of materials and man-power. These sixteen grade-crossing eliminations will cost $2,781,980.

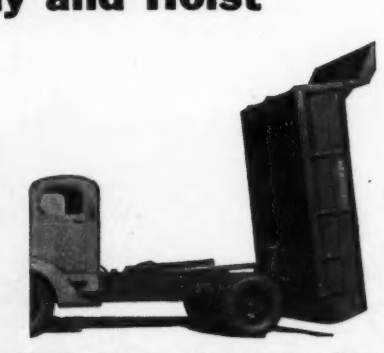
For Every Dumping Job, There's A

HERCULES HYDRAULIC

Dump Body and Hoist



Hercules Removable Side Rub Rail Body With Hinged Rear Corner Post.



Hercules High Dumper-Power Up, Power Down, with 78° dumping angle. Hoist capacity 12 tons.

Many other body styles, in many sizes, and 6", 7", 8" and 10" Hoists, are available.

USE THE HERCULES SPLIT-SHAFT POWER TAKE-OFF

To operate any truck-mounted equipment

Direct (D-700 Series), Side (D-800 Series) and Dual Drive (B) models are available for operation of almost every possible type of truck-mounted equipment, either singly or in combination.

Recommendations and complete specifications upon request.

A HERCULES HYDRAULIC BOOSTER HOIST

Makes any Truck A DUMP TRUCK

UNLOAD the EASY WAY! SAVE TIME, MANPOWER and MONEY by installing Booster Hoists under your Stake, Platform, or Special Bodies. 50° Dumping Angle will dump any material such as Coal, Grain, Earth or Sand. See your Hercules Distributor or Write

HERCULES STEEL PRODUCTS CO.

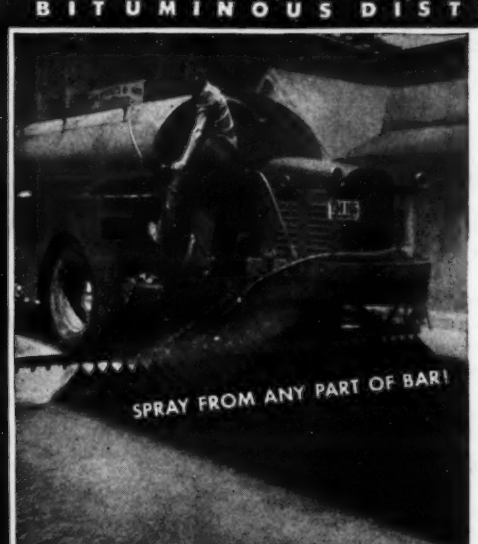
GALION, OHIO

Manufacturers of Hercules Hydraulic Hoists, Dump Bodies, Split-Shaft Power Take-Offs and "Power-Chute" Hydraulic Coal Unloaders

ETNYRE

"Black-Topper"

BITUMINOUS DISTRIBUTORS



Etnyre Full Circulating Type Spray Bar gives *positive control* of all valves for *instant* start and cut-off of spray . . . for spraying from *any part of bar.* When not spraying, material *circulates from end to end* of bar. Get full details on this *tried and proven* Spray Bar from your Dealer or write us direct.

E. D. ETNYRE & CO., Oregon, Illinois

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Designed and built by Industrial Brownhoist Corp. do a better job because, 1) Large Sheaves reduce rope wear, 2) Heavy Carbon - Steel digging lips take deep, clean bites, 3) Extra-sturdy construction insures long life. Write for complete facts to Industrial Brownhoist Corporation, Bay City, Michigan. Offices in New York, Philadelphia Cleveland and Chicago.

BROWNHOIST BUILDS BETTER BUCKETS

☆ Buy A Share In America ☆

Uses for Sodding Along Public Roads

(*Continued from page* 57)

vertical sod gutter was put in. While it was predicted four years ago that the sod would not hold, it is still in place.

There have been several instances in Division 10 where concrete gutters have been a constant maintenance problem, due to filling caused by sloughing slopes. At one location in Hocking County on U. S. 33, north of Logan, this presented an expensive maintenance item. Maintenance men had to remove soil and gravel from the concrete gutters several times per week. Then the section was landscaped, and the sloughing slopes were planted with vines and grass. Since that time, no ditch maintenance has been required. Maintenance costs were running on an average of $500 per year for this particular section. After the slopes were planted, maintenance costs dropped to practically nothing. It is believed that, if the gutters had been constructed with sod extended up the slopes a short distance, little if any maintenance would have been needed after the job was completed. Sod would have absorbed the water and stopped some of the sloughed material.

Some sod gutters in Division 10 are in good condition and giving good service many years after being constructed. There are also paved or concrete gutters constructed about the same time as the sod gutters and the paved gutters are in bad condition. It is believed that sod gutters can be used more extensively and that in the long run they will give just as good service as paved or concrete gutters, except under very rapid flows. Sod is cheaper and quicker to repair than concrete. At the base of sloughing slopes, however, concrete gutters are better, providing the slope is given proper planting to control the sloughing.

Sod Specifications

Thick sod is preferable to thin. Ohio specifications call for sod not less than 2 inches thick. Perhaps 2½ inches or even 3 inches would be better, as sod does take a beating at times, especially when being tamped by inexperienced construction labor. Thin sod will not stand handling, neither will it stand much exposure to the sun. On one job the contractor hauled the sod a distance of approximately 90 miles before it was laid. The sod in the first few truckloads was thin, being not over ½ inch thick. It was watered a few miles from the job and laid at night, without state supervision or inspection. As it was full of holes, it broke up very easily when handled. Needless to say, this particular lot of sod was taken up and rejected the following day.

Sometimes the sod is cut in lengths too long to be handled without breaking. We have tried to determine the length to be cut by the type of soil underlying the sod and find that this system works quite satisfactorily. Thin sod rolls nicely, but thick sod, in our opinion, is much better, even though it is not possible to cut it into strips over 2 feet in length. Thick sod also stands rougher handling, lays better, and will permit heavier tamping.

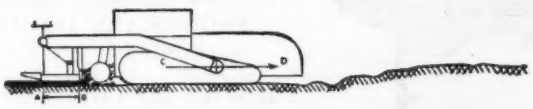
Plenty of water is an absolute essential in the maintenance of sod, but there are cases where too much water has been applied to the sod. Proper repairing of the sod is necessary, where and when needed, during the life of the contract and until the sod is well established. The mowing of sod should be deferred until it is well established, possibly the next season, although there is room for argument on this point. Several years ago, the area surrounding the Division 10 office building was sodded. The underlying soil was mostly red clay. As soon as the sodding was completed, a 10-6-4 fertilizer was applied at the rate of 10 pounds per 1,000 square feet. The following season bluegrass was sowed and, since that time, the sod has remained in excellent condition, requiring a minimum of maintenance. Fertilizer applied to newly laid sod on road jobs is a good idea if only to help offset the shock of taking up, moving, and re-laying the sod.

Proper tamping and clean-cut edges are necessary if a successful sodding job is to be done. If the base is lightly watered and the sod well watered and then properly tamped, a tighter "seal" is obtained between the base and the sod. However, the sod should not be flooded with water, nor tamped so hard that the sod is smashed. This damages the root system, and causes joints to overlap.

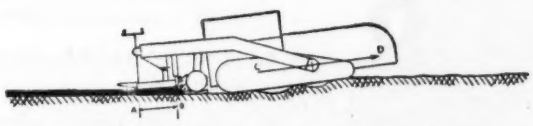
Feathered edges seem to be a common trouble and considerable quantities of sod have been rejected for this reason alone. It is also desirable that sod be laid ¾ to 1 inch below grade when abutting the metal or a concrete sidewalk. This tends to eliminate later "humping", which puts the sod out of grade and is a common cause of criticism from engineers. Where a joint is not tight, the space between should be filled with topsoil and seeded. Larger areas can be patched with sod, but small, thin, "fill-in" sod strips are not advisable.

Get behind the drive to Victory. Buy More War Bonds.

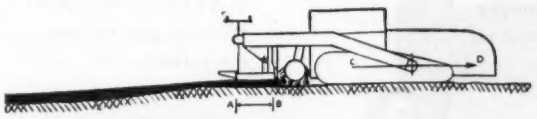
HOW A B G FINISHER LEVELS OVER THE BUMPS



With the screed adjusted for a given thickness, its undersurface, "AB," is kept parallel with the line "CD" by means of a long leveling arm.



As the crawler moves to a higher point, the screed bottom, "AB," is automatically tilted up, seeking to remain parallel with the line of pull, "CD."



The screed will then climb upward until the line "AB" is again completely parallel to the line "CD." Thus, the mix is tamped into the depression, leaving a smooth, gently-rising surface.

• Dangerously cracked and broken pavements are restored to a safe surface . . . traffic-trampled highways are transformed into smooth-riding roads with the aid of the leveling device on a Barber-Greene *Tamping-Leveling* Asphalt Finisher.

Two pivoted arms connect the tractor and screed units. These long arms account for the delayed action of the screed when the machine is climbing or descending to any new level. A rise or fall of several inches in the tractor unit is reflected only slightly on the screed plate, preventing sharp depressions or bumps in the final surface.

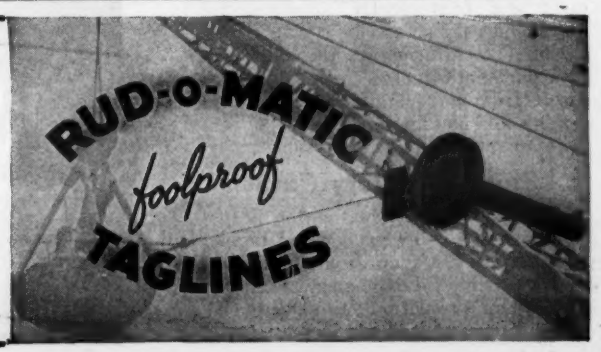
As the crawlers change level, the level of the screed is automatically, but *gradually*, altered—for it constantly seeks to keep in line with the direction of pull. And, helping to make the finished surface smoother still are the long tractor crawlers that bridge a large number of the depressions. Consequently, many changes in the level of the screed plate are avoided. For complete details on the leveling principle of the B-G Finisher write for Catalog 879. Barber-Greene Company, Aurora, Illinois.

Barber-Greene B G Constant Flow Equipment

The Rud-o-Matic Tagline is operated on a spring principle and maintains at all times a positive tension sufficient to steady a clam shell bucket under any and all conditions, and will operate perfectly with the boom at any angle. It eliminates all the grief usually encountered with the average tagline as there are no weights, tracks, pins, carriages, or sheaves to wear out or to get out of order. Because of the large bearings and fewer sheaves, the saving on cable alone would eventually pay for it.

Tagline is complete with fair lead and cable attached and can be installed in less than one-half hour. Most of the crane manufacturers have adopted the Rud-o-Matic as standard equipment.

McCaffrey-Ruddock Tagline Corp.
2121 E. 25th St., Los Angeles 11



Goodrich Takes On Line of Spray Valves

Since air and water hose for industrial purposes are often used with spray guns, nozzles, and hand-operated valves, the B. F. Goodrich Co., Akron, Ohio, is adding to its line of industrial hose a complete series of Lonn valves or blow guns, made by the Lonn Mfg. Co., Indianapolis, Ind. As a result of this recent arrangement, the Goodrich Industrial Products Sales Division will handle exclusively, through distributor channels, the nation-wide sales of these Lonn valves.

Known as air and water savers, because of their ability to exercise a positive control over air or water flow and thus reduce the consumption of water and compressed air, Lonn valves and spray guns are offered in several styles, with various degrees of flow or restricted flow. These control valves are used extensively on automobile wash racks, in garages and machine shops. The Lonn valve is featured by an integral trigger principle and involves only three working parts. It is opened and closed, without the use of springs, levers, or pushbuttons, merely by flexing the rubber nozzle or hose.

B. F. Goodrich feels that Lonn valves have a close relationship to its industrial rubber line since the company manufactures all types of rubber hose, many of which are used with air, water and fluid spray guns. It makes the rubber used in Lonn valves.

New Backfill Tamper For Easy Compaction

A new pneumatically operated backfill tamper that is easy to hold, and can be "walked over the fill" because it is exceptionally well balanced, has been announced by Gardner-Denver Co., Quincy, Ill., for compacting backfill in close quarters. The manufacturer states that it is not necessary to fight the tamper over the fill and that this factor, plus its easy-holding characteristics, permits faster and more efficient work with less operator fatigue.

This new tamper is ruggedly designed and constructed, and simple to maintain. There is no tendency toward freezing of the valve or the exhaust when operations are carried on in cold, damp weather. The piston-rod packing and pad attachment are conveniently arranged for quick and easy access.

Complete information regarding this new pneumatic tamper may be secured direct from the manufacturer by mentioning this news item.

Storage-Battery Care

The need for prolonging the life of storage batteries by proper and regular maintenance has again been emphasized by the Vehicle Maintenance Section of the ODT in a recent bulletin. Due to critical shortages of lead and increased military demands, WPB recently amended its Order L-180, restricting production of replacement storage batteries for both trucks and passenger cars during the first quarter of 1945 to the same amount manufactured in the fourth quarter of 1944.

New Walter Representative

Announcement has been made by the Walter Motor Truck Co., Ridgewood, Queens, L. I., N. Y., of the appointment of George R. Morgan as factory representative for Walter Snow Fighters and Walter tractor trucks in Minnesota, Iowa, Illinois, North Dakota, South Dakota, Michigan, and Ohio. Mr. Morgan, who will make his headquarters at 2467 Queen Ave. No., Minneapolis, Minn., has served as Assistant Resident Engineer with the Iowa State Highway Commission, with the National Park Service, as Equipment Engineer with the U. S. Army at Omaha, Nebr., and as Construction Machinery Specialist with the WPB Regional Office in Minneapolis.

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Rentals — Sales

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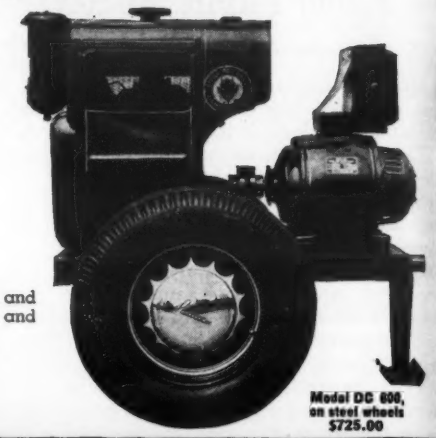

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Governors' Comments On Highway Matters

Reports Gathered by the National Highway Users' Conference Show General Interest in Road Activity

✦ THERE are now forty-two state legislatures in session and in all but four, Colorado, Georgia, Oregon, and Washington, the messages received by the legislatures from the governors of those states called attention to highway construction, maintenance, or financing. The legislatures of Alabama, Florida, Kentucky, Louisiana, Mississippi, and Virginia are not meeting this year.

Below are digests of the references to highway affairs from these messages.

North Atlantic States

Connecticut. Governor Baldwin said the Highway Department is planning for approximately $24,000,000 of projects that were in part under way when the war began. There is under consideration some $33,000,000 of highway construction that can be carried out with Federal assistance. He requested legislation "to provide a more systematic method of financing highway construction and maintenance in the future than we have in the past."

Delaware. Governor Bacon estimated that the Federal-Aid program will allocate $2,500,000 annual Federal-Aid for highways and asked for legislation permitting a bond issue in the sum of $5,000,000 for matching. His budget message advised continuation of the present tax structure, and included recommendation of $2,534,600 for the Highway Department annually. How much of this amount will be utilized for matching Federal-Aid is not apparent, but since Federal-Aid to the state will amount to $2,032,000 annually, it seems evident that substantial bond issues must be authorized.

Maine. Governor Hildreth's inaugural message discussed methods of matching the nearly $4,000,000 of Federal-Aid per year which will be apportioned to Maine at the end of the present war emergency. He said there is considerable question as to the wisdom of reissuing bonds. If this is done at all, it should be on a very conservative basis. He stated that additional taxes may be necessary if the state's surplus funds are not protected.

Maryland. Governor O'Connor reported that on June 30, 1944, the state highway system constituted 4,419 miles and that $25,798,506.52 has been spent on highways during the past two years. He claims that prison labor has resulted in the betterment of some 200 miles of highways. Maryland contemplates a $61,000,000 post-war highway program.

Massachusetts. Governor Tobin, in his budget message, recommended an additional 1-cent gas tax, a 3-cent tax on aviation gasoline, and other additional taxes in a request for a revision of the state tax structure. He stated that the present ¼-cent gas tax would be retained until the post-war highway construction program is completed, and urged planning "for an extensive program of highway construction with greater attention to the traffic problems of our urban centers".

New Hampshire. Retiring Governor Blood said he believed, with traffic returning to normal, that the State could match Federal-Aid money without increasing registration fees or gas taxes. In his inaugural message, Governor Dale asked for improvement of farm-to-market roads.

New Jersey. Governor Edge recommended post-war construction of scenic highways on which moderate tolls would be charged and asked authority from the Legislature for building such toll roads.

New York. Governor Dewey said that the surplus this year would approximate $150,000,000. He pointed out that much of the highway system is antiquated and a survey has shown that one-third of the 13,000 miles is in need of immediate reconstruction. The Department of Public Works has prepared for the state and is cooperating with municipalities to provide a minimum essential program for highways which in coming years will require more than $800,000,000.

Pennsylvania. Governor Martin in his inaugural message asked for a continuation of all emergency taxes, including the 1-cent gas tax; that the proceeds be placed in the Motor Fund; and that specific grants for streets and roads be made to local governments "so that they may reduce real-estate taxes". His budget message said there is expected to be a surplus of $110,700,000 in the General Fund on May 31, 1945, and a surplus in the Motor License Fund of $55,800,000. He recommended that the emergency 1-cent liquid-fuel tax be re-enacted but the proceeds go to the Motor License Fund instead of the General Fund and that specific grants be made to local governments for street and road purposes so they may reduce their real-estate taxes. He said that with the transfer of proceeds of the 1-cent gas tax to the Motor License Fund, revenues are estimated to be sufficient without using the surplus. The Motor License Fund will have available on May 31, 1945, a total of $220,670,000. His inaugural message stated that roads and other installations will demand attention after the war and that the Department of Highways has a comprehensive plan for the post-war period,

(*Continued on next page*)

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Governors' Comments On Highway Matters

(*Continued from preceding page*)

including through roads, elimination of traffic bottlenecks, and rural-road construction.

Rhode Island. Governor McGrath's inaugural message said post-war planning takes into account problems of by-pass highways, connecting highways, as well as many other subjects.

Vermont. Governor Proctor recommended an appropriation of $750,000 annually for Federal-Aid highway construction and $175,000 for State-Aid roads. He said that improvements to the complete state highway system of 1,800 miles will require about 19 years and, after reviewing highway needs, recommended that highway-user taxes be restricted to present uses. The pay-as-you-go policy must be maintained.

Southern States

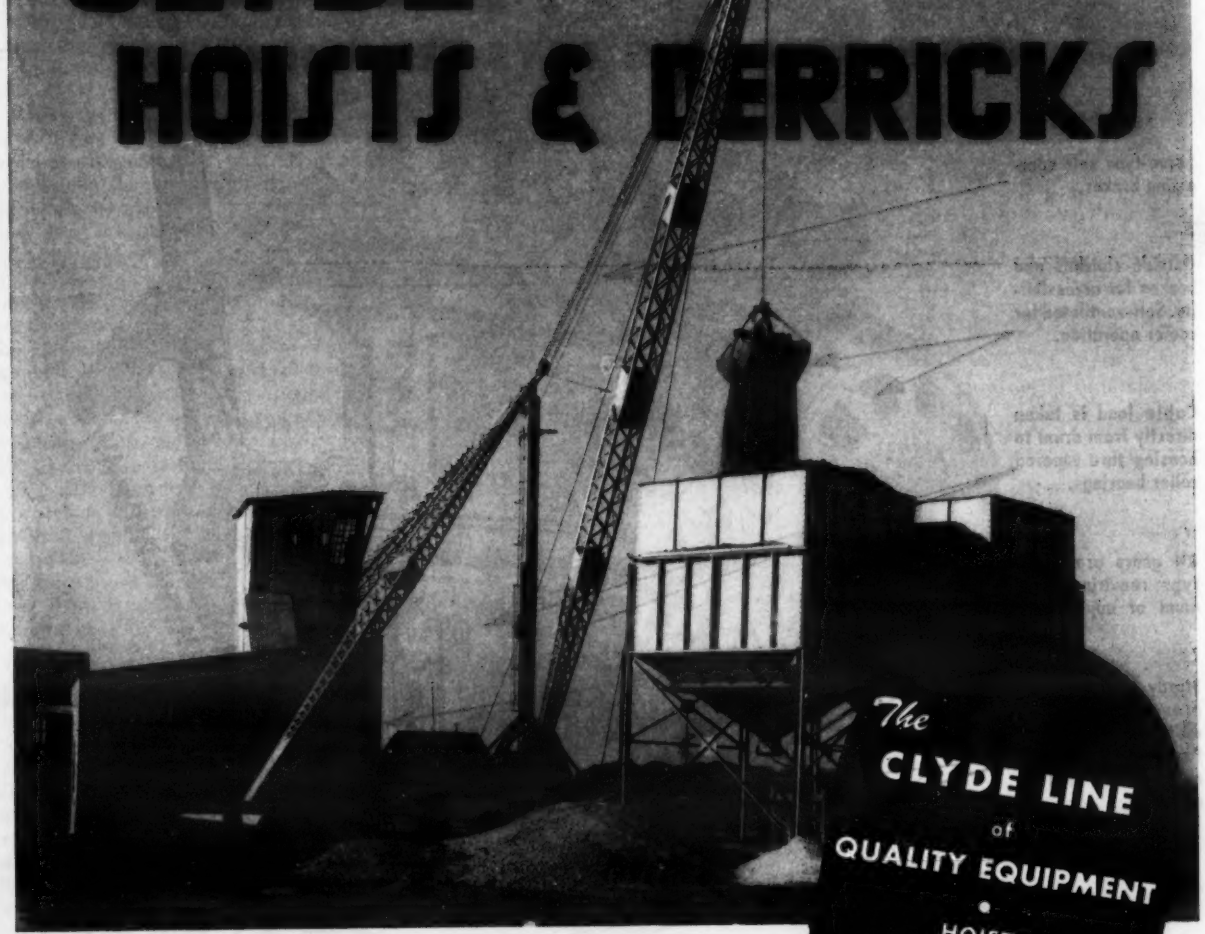
North Carolina. Governor Cherry in his inaugural address said the time has come when all-weather roads should be available to every section and community of the state, with increasing stress laid upon the construction and maintenance of county, community, and farm-to-market roads for the purpose of more adequately serving rural population. Strong hope was expressed that all school-bus routes, mail routes, and all roads leading to churches and markets would be usable the entire year.

South Carolina. Governor Williams recommended: the allotment of approximately $6,200,000 annually for highway construction for the first three post-war years; that the present limitation of $200,000 which the Highway Department can spend on highways in municipalities be removed; the Highway Commission be appointed by the Governor on advice and consent of the Senate; full cooperation with the Aeronautics Commission to take full advantage of post-war aviation development in construction and improvement of airports and roads leading to such airports; and amendment of the present law requiring transients and construction companies to register motor vehicles within ten days, to allow payment of a reasonable fee for using the roads for a limited time.

Tennessee. Retiring Governor Cooper urged a program of strict economy although the state now has a large surplus, including $12,500,000 in the highway fund. Governor McCord's inaugural message recommended no new taxes or tax increases and asked the Legislature to consider legislation necessary to comply with the Federal-Aid road program.

West Virginia. Retiring Governor Neely's budget message proposed that an appropriation for construction and maintenance of primary and secondary roads be made $750,000 greater than it was during the past two years. Governor Meadows said additional road revenues would appear to be unnecessary under existing conditions and asked for improvement of the secondary road system.

(*Continued on page 73*)



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. . . Of Our Boys Will Return From Service.
Will YOU Help?

BUY BONDS!

A viaduct carries the Chihuahua & Pacific Railroad across a canyon in Mexico, 1899.

Story of Fred Lavis, Consulting Engineer

(*Continued from page 9*)

New Englanders roared at his attire, but I was soon marveling at his design for the Pennsylvania Railroad river tunnel on which I later became Resident Engineer.

"To keep this big tunnel from sinking in the soft silt which had filled the bottom of the geologic gorge of the Hudson, Jacobs proposed driving steel piles extending 100 feet below the tunnel, which in turn was to be located 100 feet below the surface. It was an ingenious scheme, but was deemed unnecessary when cast steel segments were used in the construction, giving the tunnel enough strength to hold it in place. The problem of keeping the Hudson & Manhattan tunnel on an even keel was not so great, as this tunnel was smaller than the Pennsylvania Railroad bore, and did not carry the heavy trains required on the Pennsylvania."

Settling Down

After an early first marriage which ended two years later with the death of his wife, Fred Lavis remarried in 1902 when he was 31. By this marriage he has one son, also Fred, now 38, who became more interested in finance than engineering and is at present working for an oil company on the Pacific coast. Mrs. Lavis died two years ago.

Concerning his married life, the veteran engineer remarked slowly, "We got along very well. Ours perhaps was no great romantic love, but we got along all right. After we had lived together for a while, we began to have the same interests and to like the same things."

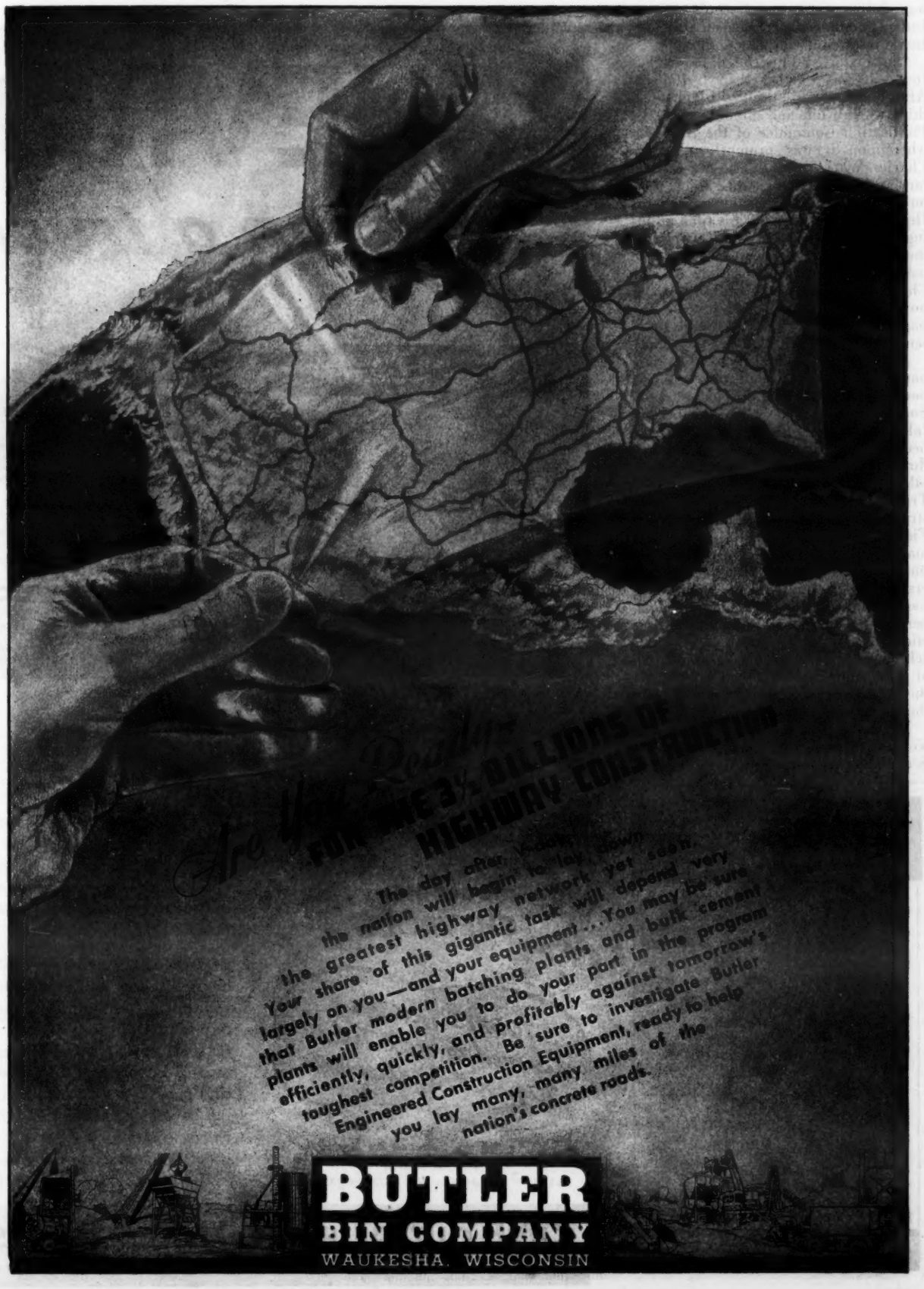
At 33 Mr. Lavis became a citizen of the country to which he had come as an immigrant boy of 16. "An Englishman, you know," he said, "feels that he does not have the same incentive to become a citizen of this country as do natives of other lands, and is generally slow about acquiring citizenship here."

By this time the peripatetic engineer had settled in one place long enough to spread out and root. After the completion of the railroad tunnel work in New York, he made his first and last venture into the contracting business. "I built a wall around the Weehawken, N. J., shaft of the Pennsylvania Railroad tunnel for $9,000," Lavis remarked with some satisfaction, "and on that job I made $2,000."

He and Fred S. Gerber, also a tunnel man, started in business in 1909 as consulting engineers with an office at 30 Church Street, New York City. That partnership broke up when Mr. Lavis went to the Argentine as Chief Engineer of the Argentine Railway Co. That was before the first great war when Great Britain was still a creditor nation and was financing and building the great railway systems of Argentina.

(*Continued on next page*)

A general view of the viaduct on the New Jersey State Highway Route 1 Extension for which Mr. Lavis was Resident Engineer in the early '20s. This was one of the first of our "superhighways".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The day after, today, the nation will begin to lay down the greatest highway network yet seen. Your share of this gigantic task will depend very largely on you—and your equipment...You may be sure that Butler modern batching plants and bulk cement plants will enable you to do your part in the program efficiently, quickly, and profitably against tomorrow's toughest competition. Be sure to investigate Butler Engineered Construction Equipment, ready to help you lay many, many miles of the nation's concrete roads.
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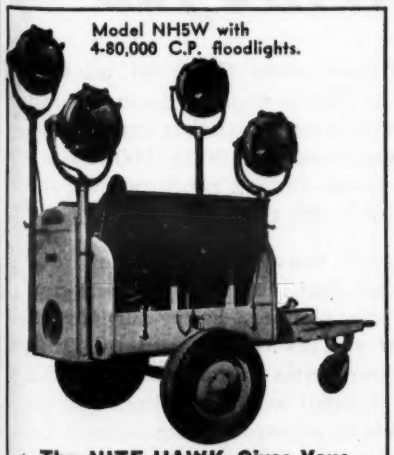

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Story of Fred Lavis, Consulting Engineer

(*Continued from preceding page*)

Becomes a Writer

When Mr. Lavis again returned to the United States he was firmly established as an authority on transportation and railroad construction, and went into business as a consultant, alone this time. Besides his practice, he has made great contributions to engineering literature. Once while attending a lecture meeting of the American Society of Civil Engineers, he got the urge to write. As he tells it:

"A whiskered fellow was up in front of the room that night presenting some kind of a foggy paper with a lot of calculus symbols scrawled on a blackboard. He kept turning his back to the audience to scribble on the board, and was frightfully dull. I turned and whispered to a friend of mine, Gillespie, who was sitting next to me, 'I could write a better goddam paper than that.' Gillespie retorted, 'Well why don't you?'

"So I started to write a paper but found it was tougher than I thought. After about a year I decided I had something worth while and submitted it to the Publication Committee of the A.S.C.E., whereupon it was promptly rejected. Charles Warren Hunt, who was Secretary at the time, told me the subject matter was fine but the writing was poor. He gave me two hours of his time pointing out the flaws in my paper. I rewrote the manuscript, which concerned the methods of railroad location on the Choctaw, Oklahoma & Gulf Railroad, now part of the Rock Island system. The paper was accepted and I finally presented it before the Society."

A book publishing house saw the paper and requested Lavis to write a text book with the title "Railroad Location, Surveys and Estimates". This he did and followed it with other texts which have been in use in engineering schools throughout the country. Some of these other works are "Building the Rapid Transit System of New York City"; "Instructions to Locating Engineers and Field Parties"; and "Railroad Estimates". These titles are now out of print but Mr. Lavis thought that the publishers lost no money with his books. He has continued to present numerous papers and articles before technical societies and in the technical press. The self-educated consultant has also lectured at Yale and Princeton Universities on the economics of railway location, and the economics of transportation.

Mr. Lavis has recently completed a work entitled "A History of Modern Scarsdale", a book about the village in Westchester County north of New York City where he lives in a big house that he built 30 years ago. "We think we are pretty good up in Scarsdale," commented Mr. Lavis, "and we ought to tell the world about our government, and our growth from a population of 600 in 1900 to 13,000 today. This book has around 175,000 words and is now being studied by a publisher, even though its commercial possibilities may be small. It tells about the growth of a modern community, with particular emphasis on its unique form of government free of partisan politics.

"In Scarsdale we have a Citizens Non-Partisan Committee composed of thirty villagers, including the President of the Town Club, the President of the Women's Club, members at large, and representatives of all the election districts. This committee selects candidates for village offices and the school board, solely on their ability and capacity for work, regardless of their political affiliations. Their names are then certified to both Republican and Democratic caucuses, and they are then nominated for election by both parties. In this way we have attained a very efficient government removed from the taint of politics."

Mr. Lavis has served this community as a Village Trustee, Mayor, Town Supervisor, and President of the Town Club.

His most recent writing is a book-long

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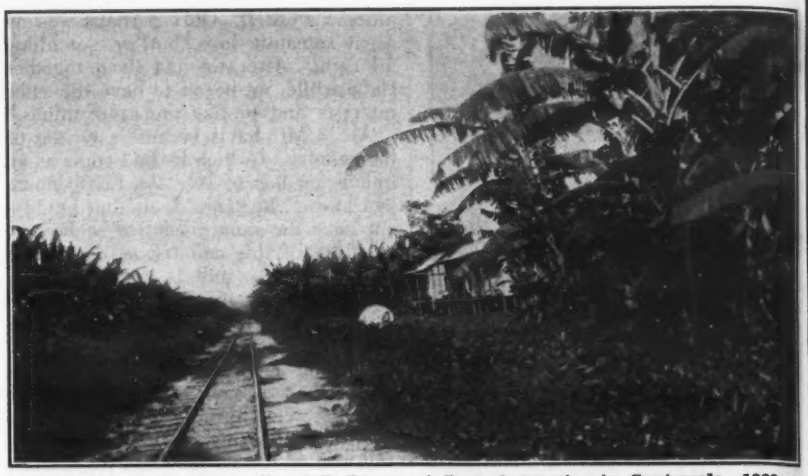

A section of the International Railways of Central America in Guatemala—1929.

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Yes, everything you want in a truck you get in the 1945 model heavy-duty *CHEVROLET*

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BUY MORE WAR BONDS—HELP SPEED THE VICTORY

POWER. *Every* 1945 model heavy-duty Chevrolet truck is powered by the high-torque Load-Master engine—designed and built for truck use exclusively. Here is an engine that can exert its maximum pulling power at low engine speed (1000 to 1900 r.p.m.) and over a wide range of road speeds (from 2 m.p.h. in low gear to 32 m.p.h. in high, with single-speed rear axle).

EQUIPMENT. *Every* 1945 model heavy-duty Chevrolet truck carries many items of equipment that increase efficiency and reliability—including oil-bath air cleaner, heavy-duty extra-capacity radiator, 10-leaf rear springs with special auxiliary (helper) springs, and side-member plates on chassis frame. All models have dual rear wheels. Special heavy-duty front springs and special axles are obtainable in numerous combinations. Of the seven chassis combinations, two are equipped with special extra-capacity single-speed rear axle, three with two-speed rear axle. A special oversize front axle (4500-pound rating) is used in the heaviest truck of each wheelbase—134½ and 160 inches.

ONE OUT OF EVERY THREE TRUCKS IS A CHEVROLET

Story of Fred Lavis, Consulting Engineer

(*Continued from preceding page*)

autobiography of some 250,000 words, now in the hands of a literary agent. "After a long, nefarious career," Mr. Lavis smiled, "my friends have persuaded me to write a history of myself. I hardly expect to get it published now, however, because of war conditions and the paper shortage."

Views on Foreign Affairs

The name of Fred Lavis frequently appears in print in letters-to-the-editor columns, particularly in the *New York Times* and *Herald Tribune*. His political faith is Republican. One subject on which he is most keen is the relationship of our State Department to Latin American countries. Being a hard-headed realist, he takes exception to a good deal of Administration policy, particularly in the Argentine.

"Argentina is one of the very few countries of Latin America," said Mr. Lavis, "which has continuously met its financial obligations to this country and its citizens. It is true that the present government of Argentina is dominated by a military junta but it is significant that the British, who are largely dependent on the Argentine for food supplies, have managed to get along with the government. After all, if our State Department is consistent, they are entitled to the kind of government they themselves elect to have.

"I am not too optimistic about postwar trade development in Latin America. Back in 1928-29 we loaned Latin America $2,000,000,000 and except for Argentina no country has paid it back." Here Mr. Lavis became forceful. "We cannot blame them entirely, because later on the Administration told those debtor countries that they should not pay the money back to the nefarious bankers who made the loans. The Administration was not cracking down on bankers, however, but was hurting small investors. The actual average purchase of Latin American securities or bonds that we got in exchange for these loans was $3,000. The money really came out of the pockets of middle-class people, the ordinary citizens of our country, who have been defrauded of their hard-earned savings.

"They can use slogans like 'good neighbor policy', 'lend-lease', 'hemisphere defense' or any other goddam term they want, but trade is built on credit, and what equipment distributor, for instance, is going to send machinery to South America without a reasonable chance of getting paid for it. Venezuela has practically no foreign debt and Argentina meets its obligations, but in trading with other countries with large foreign debts American business men, if they expect payment, will have to demand cash on the barrel-head against the bill of lading at the docks. Before the war, England and Germany traded with and extended credit to Latin America, and usually got repaid. After the war they will not have any credit to extend. We shall probably get a certain amount of ephemeral trade immediately after hostilities cease with those states possessing dollar balances in this country, but I fail to see any great trade boom unless we become more realistic in our foreign policy."

Recent Work

With this off his chest, Mr. Lavis relaxed again and talked of some of his more recent engineering work. He maintains his office in downtown Manhattan at 30 Broad Street where the same lady secretary has been handling his affairs since 1909. "I have no staff," he asserted, "so if a client engages me he can be sure that I personally, and not some assistant, will do the work."

In the early 20's Mr. Lavis was Resident Engineer in charge of the design and construction of what was then known as Route 1 Extension of the New Jersey state highways, one of the earliest of our so-called superhighways, between the Holland Tunnel and Elizabeth, N. J., 13 miles in length and built at a cost of $40,000,000.

From 1927 to 1932 he was Consulting Engineer and later President of the International Railways of Central America operating 800 miles of railway in Guatemala and El Salvador.

Mr. Lavis has been much sought after for expert testimony in legal cases, generally those involving contractors and the valuation of railroad property.

Mr. Lavis is a member of the Pilgrims, The Newcomen Society, The Pan American Society, a long list of engineering societies, both here and abroad, and of the Highway Research Board. He particularly prizes his membership in the Institution of Civil Engineers of Great

(*Concluded on next page*)

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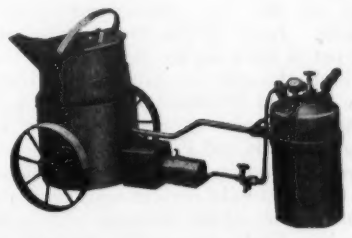

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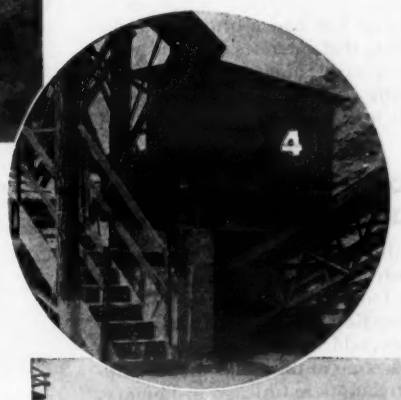
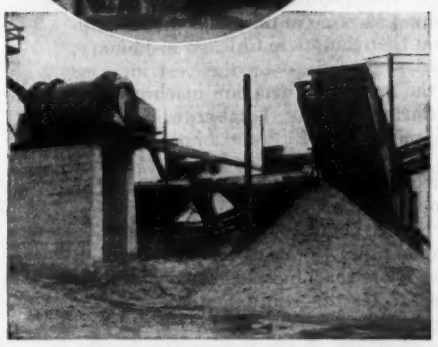
TELSMITH

1 *Telsmith Super Scrubber*
2 *Two Telsmith Sand Classifiers*
3 *Telsmith Sand Drag*
4 *Telsmith Gyrasphere Secondary Crusher*

G-11





● **Hempt Brothers, Harrisburg, Pa., are quarry and gravel plant operators. War work demands for concrete necessitated building a new plant on a large deposit near Elizabethtown, Pa. Quantity processing of the crumbly quartzose conglomerate requires generous crushing, screening, classifying capacity. Yet co-operation with the war effort meant holding the use of new machinery and critical materials to a minimum.**

One of those tough, it-can't-be-done problems. But Telsmith Engineers came through with the right answer and the right equipment. The result is a balanced, flexible, smooth-working plant turning out 75-100 tons per hr. washed silica sand.

From a scalping screen following the primary breaker, plus ¾″ material goes to a No. 36 Telsmith Gyrasphere Secondary Crusher in closed circuit with the scalper. Minus ¾″ goes to a 4′ x 10′ Telsmith double deck Pulsator Screen over a 35-ton steel bin. One size of crushed gravel is stored in bin; and plus 3/16″ pebbles are chuted to a 40″ x 22″ Telsmith high speed, roller bearing Double Roll Crusher with adjustable flow belt feeder. This crusher is also in closed circuit. Minus 3/16″ sand size goes through a 72″ x 10½′ Telsmith Super Scrubber and then to two large-bowl, 3-side overflow, twin-screw Telsmith Sand Classifiers making concrete sand which goes to a 200-ton steel bin or to ground storage. Classifier overflow is flumed to a 60″ x 30′ Telsmith Sand Drag which produces plaster sand. For details on Telsmith equipment *get Bulletin G-34*.

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Story of Fred Lavis, Consulting Engineer

(*Continued from preceding page*)

Britain. Twice the Arthur M. Wellington Prize has been awarded to Fred Lavis for papers on transportation.

Life of Riley

Mr. Lavis now spends his time either at his home, office, or at the Union League Club, that ultra-respectable menage of the city's conservative older males. Here in the club lounge the carpet is thick on the floor, the ceiling is high, the seats are soft, and the lights are subdued. Around on the walls full-length portraits of men, mostly Civil War generals and Presidents, survey the scene. Two long tables down the middle of the room hold current magazines and many copies of the morning editions of the New York papers. The *Daily News* and *Mirror* were all out, as the other members sat around near the windows reading the comic strips of these tabloids.

"I have to take it easy now," Mr. Lavis resumed from the depths of his easy chair, "and I find that the easiest thing in the world to do, though I still commute to Venezuela and way stations. Recently I told my friend, Francisco J. Sucre, Director of Ways of Communications in the Venezuelan government, that I was living the life of Riley. He asked who was this Riley whose life I was living. I was in Venezuela last year from December to May and may leave for there again any day now."

Each new consulting engineering assignment is a fresh adventure to Fred Lavis. He has found the small jobs to be every bit as interesting as the million dollar projects.

"I was a trifle embarrassed a few years ago," Mr. Lavis admitted, "when a man came to my office and asked me to make a survey of a mine for him in Virginia. I told him I would get a party and send them down to do the work. This client demurred, however, saying that I had been highly recommended to him, and that he wanted me to make the survey personally. First I felt that at my age my prestige as a big consultant would not permit me to go tramping around some blooming mine, but as I had a little spare time on hand I decided to take the assignment. I went down and made that survey myself and had a perfectly grand time in the month I spent doing it."

Fred Lavis has had a grand time doing anything that interests him and what does not interest him, he feels, is not worth doing, but as his interests are legion he is usually a busy man.

Role of Construction Machines in the War

As an illustration of why there can be little construction equipment for use on the home front at this time, Major General Eugene Reybold, Chief of Engineers, U. S. Army, addressing the Twenty-Sixth Annual Meeting of the Associated Equipment Distributors in Chicago in January, cited some figures on the vast increase in the use of construction machinery by our armed forces. Total crawler-tractor shipments in 1940, for example, amounted to $90,000,000, and in 1944 they reached a total of $300,000,000. The production of cranes and shovels has increased about 300 per cent, crushing plants 1,300 per cent, and so on in almost every machine category. The great demand for this equipment is due to the expansion of our battle fronts in all theaters of action, and to the increased activity on these fronts. Also, such equipment in a theater of war takes a terrific beating, far worse than any experienced by equipment in the hands of skilled operators under conditions of peace, and therefore replacements must necessarily be high.

In this connection, General Reybold mentioned the job being done by the service shops of equipment distributors in the rehabilitation of equipment. During the past year, 15,000 pieces of machinery, ranging from 2-inch pumps to 5-yard shovels, have been so reconditioned. The volume of equipment rebuilding, including the spare parts supplied, represents at least $30,000,000. During the first six months of 1944, about 2,000 pieces of equipment were repaired and rebuilt each month, but this dropped down to about 500 pieces a month during the latter part of the year.

Cleaver-Brooks Appointment

The Cleaver-Brooks Co., Milwaukee, Wis., manufacturer of tank-car heaters and similar asphalt-handling equipment, has announced the appointment of Frederick W. Hainer as Vice President of the company.

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and include in your Specifications—

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TODAY leading Highway Engineers are drawing plans for Tomorrow's Highway and are including in their specifications TUTHILL HIGHWAY GUARD RAILS. Why? Because TUTHILL meets the exacting standards . . . of Safety . . . of Strength . . . of Low Installation and Maintenance Costs.

Why are TUTHILL Guard Rails safe, strong, easy to install and maintain? The *design* is the answer—concave surface, deflective action, and unusual visibility. *(Available for complete installation, maintenance and repairs.)*

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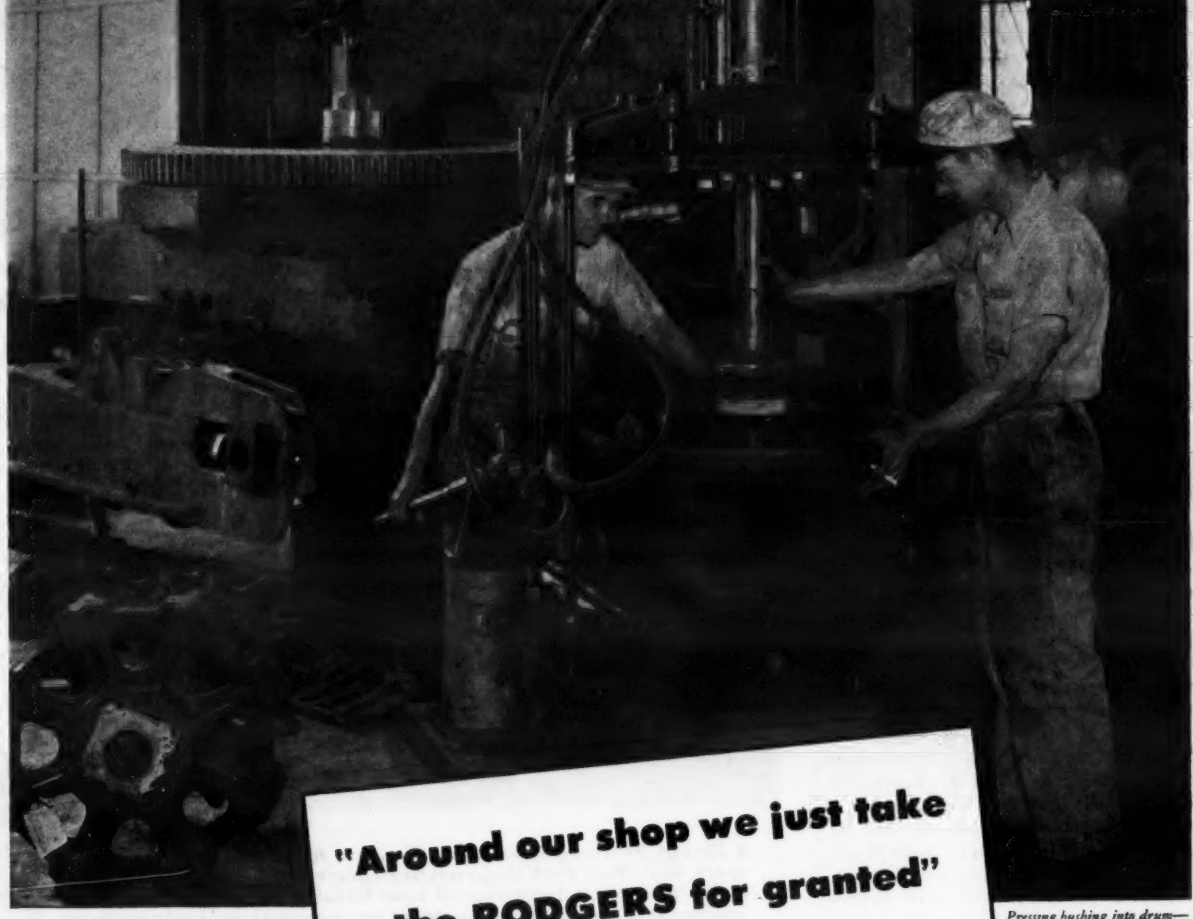
NO. 24 OF A "READY-WITH-A-RODGERS" SERIES

HYDRAULICS Rodgers



"Around our shop we just take the RODGERS for granted"

Pressing bushing into drum—photo courtesy Choctaw, Inc., Memphis

"For five years now our Rodgers Universal Press has been proving that it has the stuff. We've strained this unit to the extreme, away beyond its intended capacity. It's so adaptable that we've even used it in production welding, when the job called for pressure on a jig. We'd be lost without it."

That's how James L. Nellis, vice president, Choctaw, Inc., Memphis, feels about the Rodgers Universal Press. It saves time and money, wherever portable pulling, pressing, or lifting power is needed. *If it's a Rodgers, it's the best in hydraulics.* 4 sizes—one for *your* job. For complete information and prices, write or wire Rodgers Hydraulic, Inc., 7415 Walker Street, St. Louis Park, Minneapolis 16, Minnesota.

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"Surplus Equipment" Aid to Current Jobs

Ed Phillips Tells AED That Surplus Machines Now Available for Resale Can Contribute to Wartime Needs of Construction and Agriculture

♦ SPEAKING before the Twenty-Sixth Annual Meeting of the Associated Equipment Distributors, Ed Phillips, Director, Construction Machinery and Farm Equipment Division, Office of Surplus Property of the Treasury Department, discussed the "spot-bid method" of disposing of surplus equipment, and pointed out that equipment distributors can find in the machinery now available for resale the answer to their wartime problem of keeping their organizations alive and on top. "Distributors whose shops are equipped to rebuild and repair surplus equipment are making an additional contribution to wartime needs in industry and agriculture when they purchase such equipment now for resale," Mr. Phillips stated.

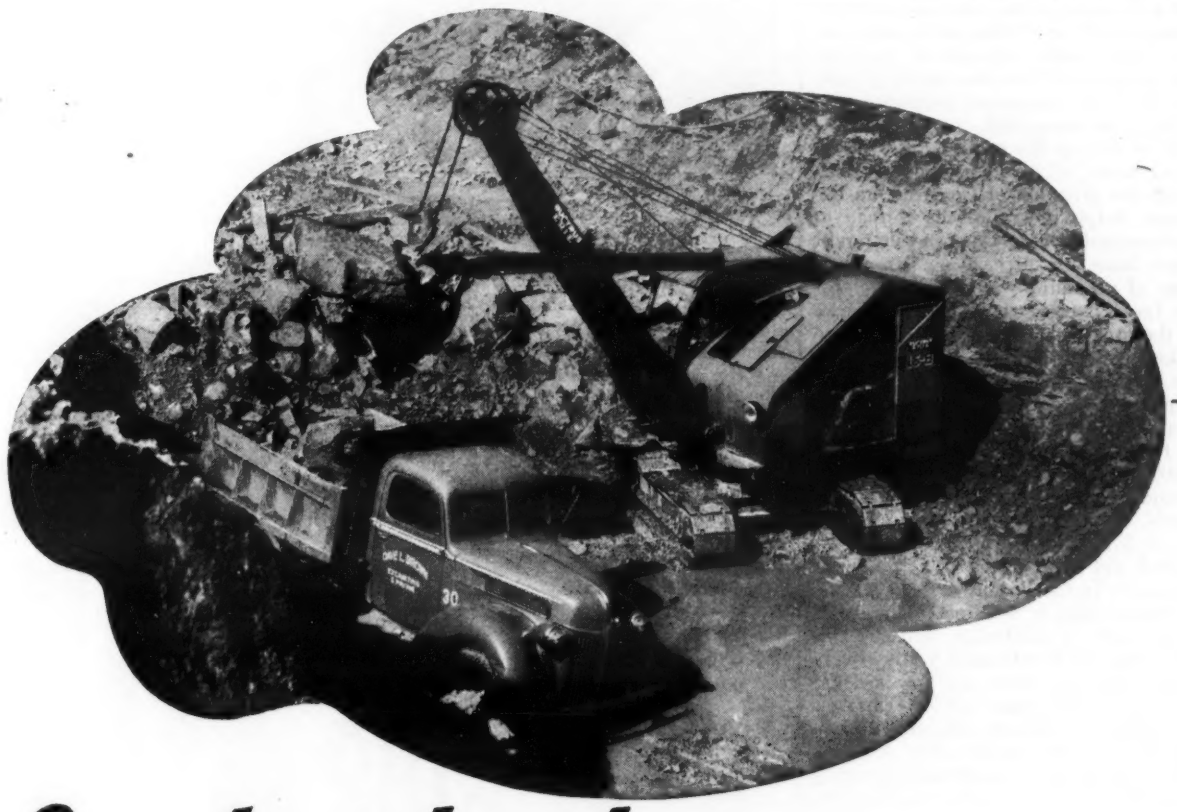
Objective of Method

The present Government policy in handling the disposal of surplus equipment is to sell through regular channels of trade. Up to the present time, no business has been done direct with consumers, except in cases where equipment was offered to distributors first and they failed to bid a reasonable wholesale price or showed no interest whatsoever. Mr. Phillips said that he felt any attempt to set the Government up in the retail business on a national scale would be inefficient and uneconomical, and that consumers can best be served by purchasing from their dealers who have the facilities to rebuild and service the equipment.

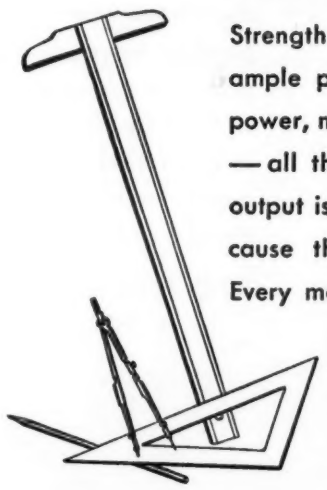
Under the spot-bid method, potential purchasers of available surplus goods are advised in advance of a time and location at which a sale will be held. At this sale, formal bids on cards are received from those present and, if a reasonable price is offered, the sale is consummated "on the spot". While this method has not yet been established as a standard national policy, it is reported that buyers present at experimental sales of this type considered it a fair and expeditious method.

The objectives of this method are:

1. To develop a plan with simplicity, speed, and the least possible cost in the disposal of surplus property by the Government with the least amount of difficulty and expense in procurement on the part of the bidder, using all the good features of the formal-bid method and the auction method, and eliminating all the bad features of the informal and negotiated methods.
2. To dispose of surplus property in an orderly and prompt manner.
3. To obtain for the Government a fair price and to assure sale of surplus property by fair and unique methods in such quantities and with such terms, conditions, and policies as will discourage disposal to speculators and for speculative purposes.
4. To foster wide and equitable distribution of surplus property.
5. To prevent, insofar as possible, unusual and excessive profits by fully testing the market on all sales and creating a fair competitive method of distribution.
6. To cooperate fully with all declaring agencies by expediting the sale and removal of surplus property within a reasonable time after it is declared by the Government.
7. To plan the sales program so that surplus property will not accumulate, with due regard for the protection of our overall economic structure.
8. To develop the policies and procedures for the sales program so that it will have public appeal, confidence, and the respect of all.
9. To make available to the public all sales policies, procedures and results of any and all transactions.



Individual DESIGN
MEANS GREATER OUTPUT



Strength without excessive weight, ample power without wasted horsepower, maximum speed, top efficiency — all that adds up to profit-making output is yours with Bucyrus-Eries because they're right for their work. Every model is individually designed, with just the right combination of power, strength, and weight to do the job of handling its dipper load. That means low maintenance, too, because there's no overstressing of gears and shafts — none of the excessive wear that comes with makeshift models.

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Individual design of each model is just one of many reasons why Bucyrus-Erie excavators are setting outstanding records in the battle regions, why they are always tops in output. The full Bucyrus-Erie performance story will convince you.

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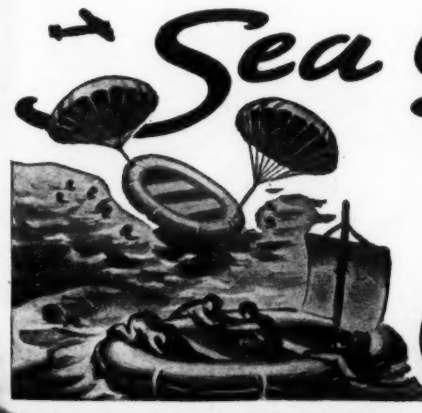

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OWEN BUCKETS
A MOUTHFUL AT EVERY BITE

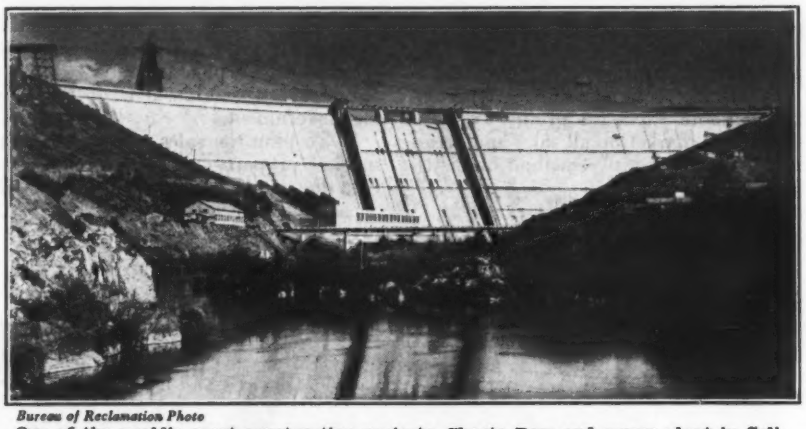
FOR VICTORY
BUY UNITED STATES WAR BONDS AND STAMPS

Gigantic Shasta Dam Virtually Completed

With the last bucketful of concrete poured to complete the highway across its crest, Shasta Dam, key structure in the Bureau of Reclamation's Central Valley Project in California, was practically finished at the beginning of 1945. Yet to be installed are the spillway drum gates, electric generating units, elevators, and other metal equipment, most of which must wait until the end of the war, but the dam and power plant are now 95 per cent completed.

Built during the past six years by a small army of engineers and workers under the direction of Construction Engineer Ralph Lowry of the Bureau of Reclamation, Shasta Dam and its power plant have already swung into their tasks of providing water and power for the farms, towns, cities, and industries of the area extending from Redding to Bakersfield and from San Francisco to the Sierras. Behind the world's second largest and second highest concrete dam, winter rains are filling the reservoir. Of its total capacity of 4,500,000 acre-feet, 1,500,000 acre-feet already are impounded against next summer's water needs. Of the power plant's total capacity of 375,000 kw, 150,000 kw are installed and their output is helping war industries in the Bay area.

Shasta Dam is 602 feet high, has a crest length of 3,500 feet, and contains more than 6,532,000 cubic yards of concrete. Into the dam and power house have gone more than 6,760,000 barrels of cement, 11,780,000 tons of sand and gravel, and 30,694,000 tons of steel. During the peak of construction activity, more than 5,000 men were employed on the project. Pacific Constructors, Inc., was the contractor, with Frank Crowe as General Superintendent.



Bureau of Reclamation Photo

One of the world's great construction projects, Shasta Dam and power plant in California are now 95 per cent completed.

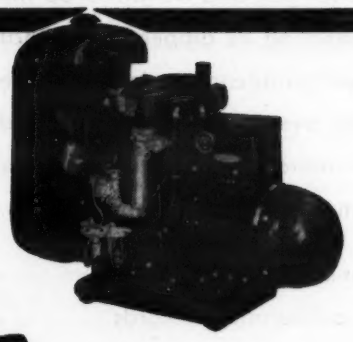
Three Regional Offices Established by Jaeger Co.

Regional headquarters in New York City, Chicago, and Birmingham, Ala., have been established by the Jaeger Machine Co., Columbus, Ohio, maker of a complete line of mixers, pumps, air compressors, concrete and bituminous machinery and other contractors' equipment. This action was taken to meet the increased sales and service requirements needed to coordinate plant and equipment expansion during the war and for the post-war construction program.

L. T. Phillips has been appointed Eastern Regional Manager to direct sales and service of Jaeger equipment in the New England and Atlantic Coast states as far south as North Carolina. Branch offices in Baltimore, Philadelphia, and Richmond will supplement the New York headquarters. The Chicago area will be in charge of V. G. Mandt, who will cover the area from Illinois and western Michigan to Kansas, Nebraska, and the Dakotas, with branch offices in St. Louis and Minneapolis. The southern area from Tennessee south to the Gulf and west to Arkansas will be serviced from the Birmingham, Ala., headquarters, of which E. G. Mandt is Regional Manager.

Holt Made Tyson Director

William K. Holt, President of the William K. Holt Machinery Co., of San Antonio, Texas, distributor of heavy construction machinery, has been elected a director of the Tyson Bearing Corp., Massillon, Ohio. Mr. Holt was formerly President of the Mexico Tractor & Machinery Co., of Mexico City, which he founded, and before that was connected with the Holt Mfg. Co., the forerunner of the Caterpillar Tractor Co. He is a member of the Associated Equipment Distributors.



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Driven by Onan-built, 4-cycle gasoline engines, these power units are of single-unit, compact design and sturdy construction. Suitable for mobile, stationary or emergency service.

Models range from 350 to 35,000 watts. A. C. types from 115 to 660 volts; 50, 60, 180 cycles, single or three-phase; 400, 500, and 800-cycle, single-phase; also special frequencies. D. C. types range from 6 to 4000 volts. Dual voltage types available. Write for engineering assistance or detailed literature.

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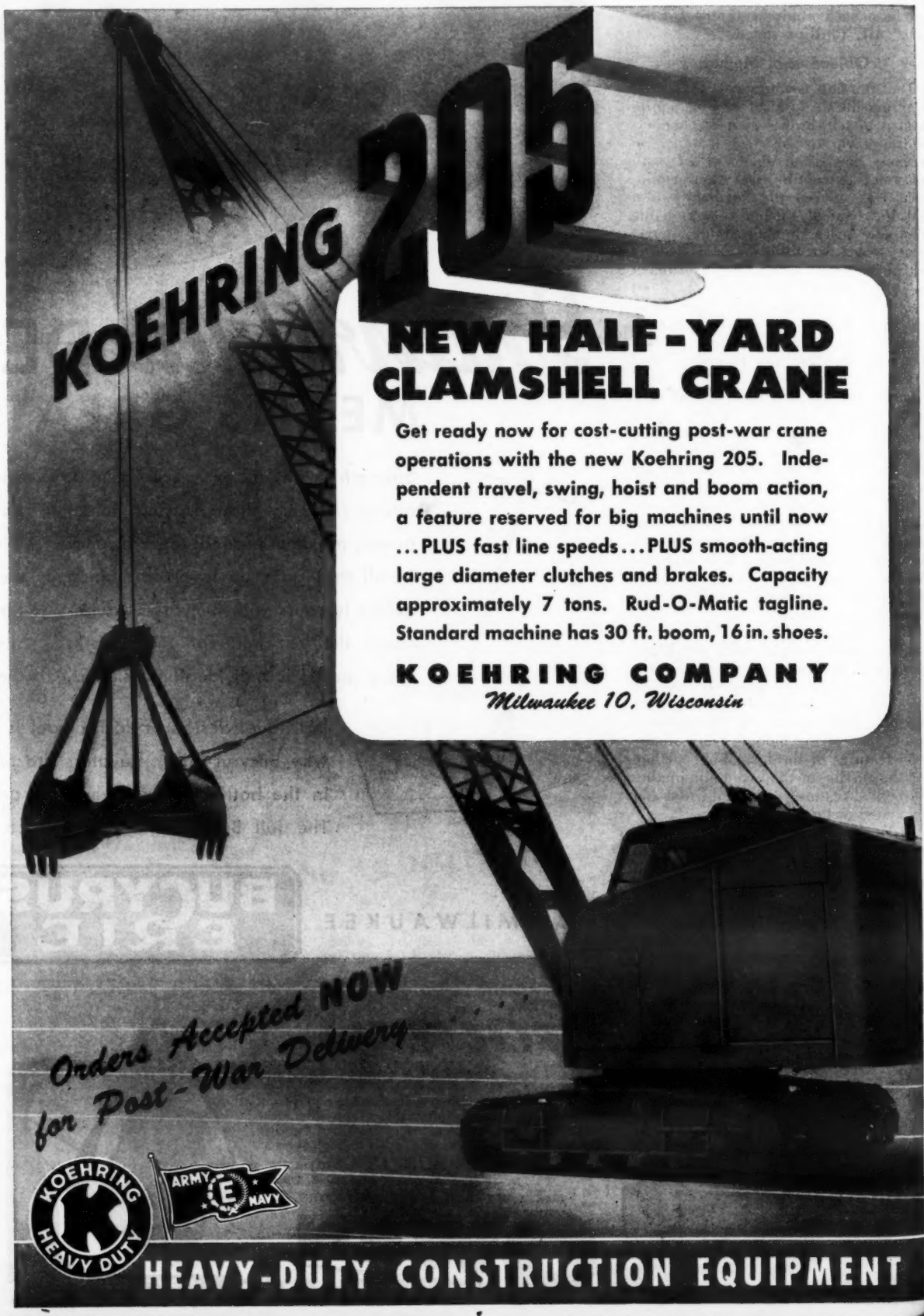
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Get ready now for cost-cutting post-war crane operations with the new Koehring 205. Independent travel, swing, hoist and boom action, a feature reserved for big machines until now ...PLUS fast line speeds...PLUS smooth-acting large diameter clutches and brakes. Capacity approximately 7 tons. Rud-O-Matic tagline. Standard machine has 30 ft. boom, 16 in. shoes.
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Orders Accepted NOW for Post-War Delivery
KOEHRING HEAVY DUTY
ARMY E NAVY
HEAVY-DUTY CONSTRUCTION EQUIPMENT

Universal Atlas Acquires Plant at Osborn, Ohio

The Universal Atlas Cement Co., New York, has announced its purchase of certain assets, consisting of lands, buildings and machinery, of the Wabash Portland Cement Co., Osborn, Ohio. After extensive repair and improvement, the plant, which has been shut down for over a year, will re-open for the manufacture of Universal portland cement, Duraplastic air-entraining cement, high-early cement and mortar cement.

It is felt that the acquisition of this plant, with a capacity of about 2,000,000 barrels per year, will improve service to Universal Atlas customers in southwestern Ohio, southeastern Indiana, and eastern Kentucky.

Rosholt Dealer Company Operates Under New Name

The distributor company formerly known as the Thorman W. Rosholt Co., 3138 Snelling Ave., Minneapolis, Minn., has now assumed the name of the Rosholt Equipment Co., and at the same time the ownership was taken over by Harry V. Johnston. Only the name and ownership have changed, however, and the management of the organization remains in the hands of Reuben Rosholt, General Manager, J. A. Miller, Sales Director, and F. M. Thimmesh, Assistant Manager.

One of the oldest construction-equipment distributor firms in the Northwest, this company was established in 1916. Among the major equipment lines represented are International Harvester, Bucyrus-Erie, Koehring, J. D. Adams, Buffalo-Springfield, Chicago Pneumatic, Cleaver-Brooks, C. S. Johnson, Klauer, Macwhyte, Owen Bucket, Parsons, Hyster, Barco, Good Roads, Union Iron Works, Lidgerwood, Rogers Bros., Clyde Iron Works, Drake-Williams-Mount, Kwik-Mix, Rosco, and Gorman-Rupp, as well as a number of other lines.

New Skilsaw Appointments

The Board of Directors of Skilsaw, Inc., Chicago, Ill., manufacturer of portable electric Skiltools, has recently promoted E. J. Kelley to the office of Vice President in charge of Engineering, and named J. L. McManus Secretary of the company. Mr. Kelley was formerly Secretary and for many years has directed engineering and new product development. Mr. McManus, an attorney, has been promoted to his new position from that of Director of Purchases. The Directors also announced the election of E. B. McConville, Treasurer, to membership on the Board.

the Job— Laying 103,500 cu. yd. of concrete in a hurry

the Equipment Three Multi Foote 34 E Pavers

BUILDING one of the longest and best constructed airport runways in the country, 8500 feet long, 200 feet wide, and 12 inches thick, and laying other necessary surfacing for handling 175,000-lb. wheel loads for a total of 103,500 cu. yd. of concrete is one of the more recent jobs finished in record time by three Multi Foote 34 E Pavers. The average concrete production was 1560 cu. yd. for a ten hour shift, with a high day of 2258 cu. yd.

Records like this for paving airports and roads are everyday production for Multi Foote Pavers because every feature is built for better mixing and faster charging and discharging. Double cone drum with its end-to-end scouring action insures a complete and thorough mix of every batch. Rotary discharge takes only a quarter turn to pour concrete into the big bucket ready to speed out the long boom to be discharged. One of the most important features of every Multi Foote is the high operating platform which provides greater visiblity for faster, more accurate work.

Write direct or ask your Foote dealer for details.

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CONCRETE PAVERS

ADNUN BLACKTOP PAVER

New High-Efficiency Self-Priming Pumps

Following a year of intensive engineering development, Barnes Mfg. Co., Mansfield, Ohio, has announced a new post-war line of high-efficiency self-priming centrifugal pumps complete from 1½ through 6-inch sizes. This line, which is now available for shipment to Barnes distributors, has been designed to deliver as much as 50 per cent more water than former Barnes pumps.

In the redesign program, which also includes the casing, many new and improved construction features have been added. When repair is necessary, part replacement is made easy due to the simplified design. The manufacturer reports the following construction advantages in this new line: a positive high-speed automatic prime with no moving parts in the pump mechanism; a positive water seal; direct-in-line suction flow; new-type non-clogging impeller; sure and low-cost impeller adjustment; elimination of angular corners in the volute; and rigid factory testing.

Complete information regarding this new line of Barnes pumps may be secured direct from the manufacturer by mentioning this news item.

Motor Trucks and Parts Are Now in Battle Dress

The extent to which warfare has become automotive combat is brought out forcibly in the 1944 edition of "Motor Truck Facts", a biennial publication of the Automobile Manufacturers Association, which has just been issued. Revelation that 226 distinctly different types of military vehicles are now being made by the automotive industry is but one of many indications of how thoroughly warfare has been motorized in the thirty years since September, 1914, when every available taxicab in Paris was rounded up to transport troops to the front in time to halt the Germans at the Marne.

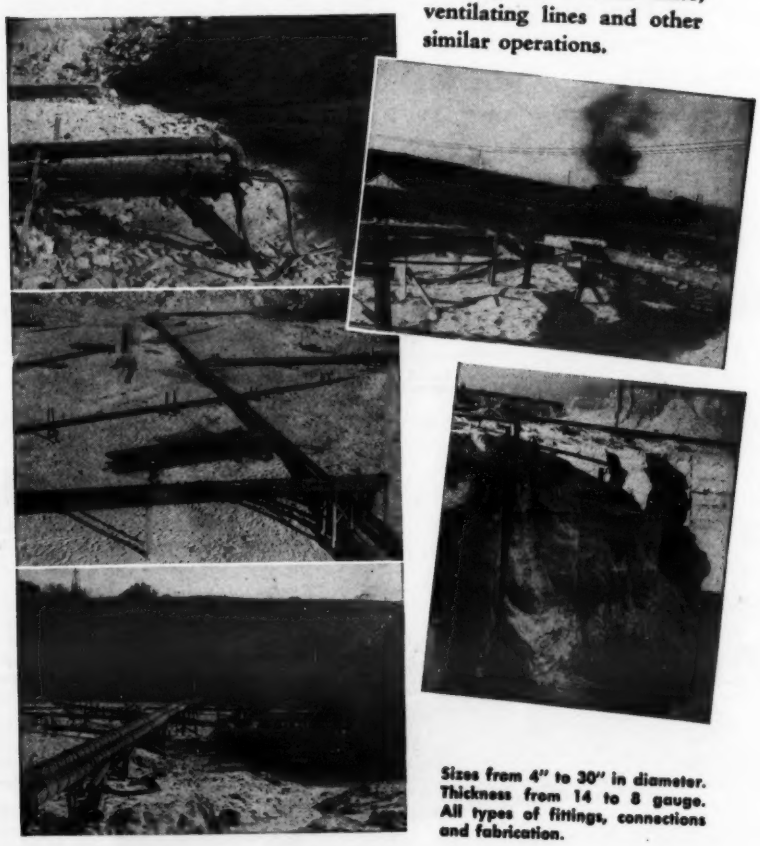
The truck manufacturing industry of the United States is now producing military vehicles and parts at the rate of $2,500,000,000 a year, or two and a half times the total value of all trucks and parts manufactured in 1941, the peak peacetime production year. Since the beginning of the war, more than 2,240,000 motor trucks have been produced for the Army and Navy.

In addition to other interesting facts on automotive equipment at war, the 1944 edition of "Motor Truck Facts" includes its customary valuable data on the number and uses of trucks in this country and various other pertinent information helpful to motor-truck owners.

Copies may be secured direct from the Automobile Manufacturers Association, New Center Bldg., Detroit 2, Mich.

NAYLOR PIPE
HELPS OTTAWA SILICA
MOVE MOUNTAINS

Naylor light-weight pipe is at its best on tough jobs like the Ottawa Silica Company operation at Ottawa, Illinois. The greater strength, leak-tightness, safety and economy provided by Naylor's exclusive Lockseam Spiralweld structure, plus Naylor's advanced-type coupling medium make this pipe ideal for hydraulicking, sand and gravel conveying lines, high and low pressure water lines, ventilating lines and other similar operations.



Sizes from 4" to 30" in diameter. Thickness from 14 to 8 gauge. All types of fittings, connections and fabrication.

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SPIRALWELD PIPE

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NEW YORK OFFICE
350 MADISON AVENUE, NEW YORK 17, N. Y.

ERIE PORTABLE AGGREMETER PLANTS

● These 3 standardized sizes of Erie general purpose Portable Aggre-Meters are serving all parts of U.S.A. In writing for data, refer to size required: GA 36 yd. or 54 ton
GA 52 yd. or 78 ton
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ERIE STEEL CONSTRUCTION CO.
ERIE, PENNSYLVANIA
Aggre Meters • Buckets • Concrete Plants • Traveling Cranes

"GOOD MACHINES"

Good installation demands that joints be placed at exactly the 'right' moment—necessitating a rapid machine. Often joints are placed when the concrete is too 'wet' or too 'dry'. It is not necessary to float, matrix in low places, nor work concrete along joints when dry.

Machine installation of all kinds of contraction joints increases the value of roads by—better and more uniform installation.

FLEX-PLANE joint installing machines eliminate messy hand methods. Install all types of joints . . . ribbon, poured, premoulded, etc., with or without VIBRATION.

• *Ask for Equipment Specifications* •

FLEXIBLE ROAD JOINT MACHINE CO. WARREN, OHIO

Governors' Comments On Highway Matters

(*Continued from page 64*)

Midwestern States

Illinois. Governor Green said it will be impossible to reduce state taxes and that half of the municipalities' share of the gas tax should be made available for lighting, policing, and drainage of local highways and streets. A program will be ready for immediate construction of highways just as soon as conditions permit.

Indiana. Governor Gates asked the Legislature to pursue a course which will preserve the General Fund balance of $40,000,000. He promised a special budget message in the near future and urged the Legislature to study Indiana laws and their relation to the Federal-Aid Highway Act.

Iowa. Governor Blue's inaugural message sounded a note of caution in the spending of surplus funds and admonished the Legislature that thrift and economy are necessary in government. He said the first roads to be improved after the war should be rural mail and school-bus routes.

Kansas. Governor Schoeppel in his inaugural message stressed the safeguarding of all state surpluses for post-war years. He recommended a "definite highway plan for road improvement" but failed to endorse the ten-year expansion program planned by the State Highway Commission. This would require new revenues in the amount of approximately $16,000,000 annually.

Michigan. Governor Kelly emphasized that Michigan is entirely out of debt, and he estimated state revenues for the present fiscal year at $158,000,000 against appropriations of $138,000,000. The State Highway Department is engaging in the preparation of surveys and plans for a post-war highway construction program of approximately $140,000,000.

Minnesota. Governor Thye reported that at the beginning of the present fiscal year there was a surplus of $15,700,000 in the trunk-highway fund and by the end of the present year this will probably reach about $18,000,000. The Department of Highways has completed plans on about $28,000,000 of highway work. Enough funds will be available to match Federal funds, it is believed.

Missouri. Governor Donnell said it was his information that the State Highway Department was prepared to expend approximately $85,000,000 on roads and highways in a four-year period following the war, about one-half of which will be available from the Federal government.

Nebraska. Governor Griswold called attention to the fact that less than half of the money allotted to Nebraska by the Federal government for highway construction can be matched with present funds. However, he did not suggest new forms of taxation.

North Dakota. Retiring Governor Moses reported that the Highway Department has a substantial balance available for highway construction and improvement. He said the gas-tax law has not been satisfactory but urged careful study before it is amended.

Ohio. Governor Lausche urged that no changes be made in the existing tax structure and that such taxes as the 1-cent liquid-fuel levy be re-enacted.

South Dakota. Governor Sharpe said the Highway Commission has made plans for an extended amount of repair and construction at the end of the war "designed on the basis of taking advantage of all possible aid offered by the Federal government". He asked that the Governor be specifically authorized to appoint as members of the Highway Commission any other public officials and fix their compensation.

Wisconsin. Governor Goodland's budget message recommended for highway activities for 1945-47 the sum of $73,879,462, compared with $63,216,055 in the 1943-45 biennium. He said there is a segregated fund of $29,491,000 available for highway construction at such time as conditions permit, and reported that the State treasury has built up substantial cash balances despite decreases in gas taxes and other receipts.

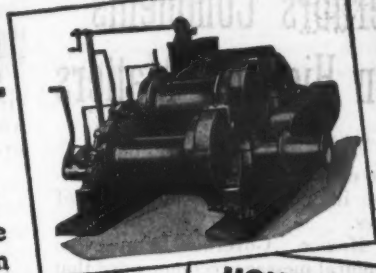
States in the Southwest

Arizona. Governor Osborn's budget message requested, in a $40,000,000 budget, over $5,000,000 for the Highway Department for the next two years, the first time that agency has been included in a general budget. These figures do not include funds for construction and improvement.

Arkansas. Governor Laney stated that he would not tolerate a policy of patchwork construction and development of highways for the sake of political expediency and said the State must be

(*Concluded on next page*)

Hoists to Fit the Job



Lidgerwood hoists have earned a 70-year reputation for dependability and efficiency *on the job.* There's a Lidgerwood gasoline, steam, electric or Diesel hoist to fit every construction need. When you need a hoist inquire *first* of LIDGERWOOD.

HOISTS FOR:
CABLEWAYS
INDUSTRIAL PLANTS
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ESTABLISHED 1873
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A sound plan

for peacetime jobs

in your community

America's network of highways and secondary roads is in need of three billion dollars' worth of repair and new construction annually.

- *This expenditure can mean the steady employment of millions of people for many years.*
- *It can act as a stabilizer for periods when private construction drops.*
- *It can go far toward doing away entirely with the threat of relief work and unemployment.*

This situation presents an opportunity for you to be of very real service to your community. Why not lay the facts before your local government — *now*, while there is still time for sound postwar planning?

And remember this: The use of Tarvia in the building of needed miles of secondary and feeder roads in your community will mean the employment of *local* materials, supplied and applied by *local* labor. That can mean a lot of jobs for a lot of folks in your community, when jobs may be needed.

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Barrett Tarvia*

*Reg. U. S. Pat. Off.

Governors' Comments On Highway Matters

(*Continued from preceding page*)

ready to cooperate with the Federal government in post-war development of highways.

New Mexico. Governor Dempsey in his inaugural message recommended that authority be given the State Board of Finance to allocate the General Fund surplus of $1,365,000 for the construction of highways and public buildings. The Highway Commission has accumulated a cash surplus of approximately $2,000,000 and he said it would be possible, by using this surplus and the General Fund balance, to match all Federal-Aid allotments for highway construction by the issuance of a minimum of debentures.

Oklahoma. Governor Kerr recommended increased appropriations for public highways, earmarking of funds for building of farm-to-market roads, and taking advantage of Federal matching of funds for such purpose. This should be financed by placing in the highway fund all gasoline taxes, surplus revenue from the current year, and all motor-vehicle and bus taxes. He recommended in a radio speech that certain highway-user taxes now going to counties should go to the State Highway Commission for use in matching Federal funds.

Texas. Governor Stevenson reminded the Legislature that economy is still in order. He suggested no overall tax increases but recommended construction of a network of farm-to-market roads after the war.

Western States

California. Governor Warren said that preparations have been nearly completed for an $80,000,000 highway improvement program and asked the Legislature to reappraise the entire system in order to plan soundly for the future. He also recommended in his budget message that a $40,000,000 highway-fund reserve be held for post-war construction of state highways to provide work in localities where need for employment may develop. He did not endorse any proposed gas-tax increase to provide additional funds.

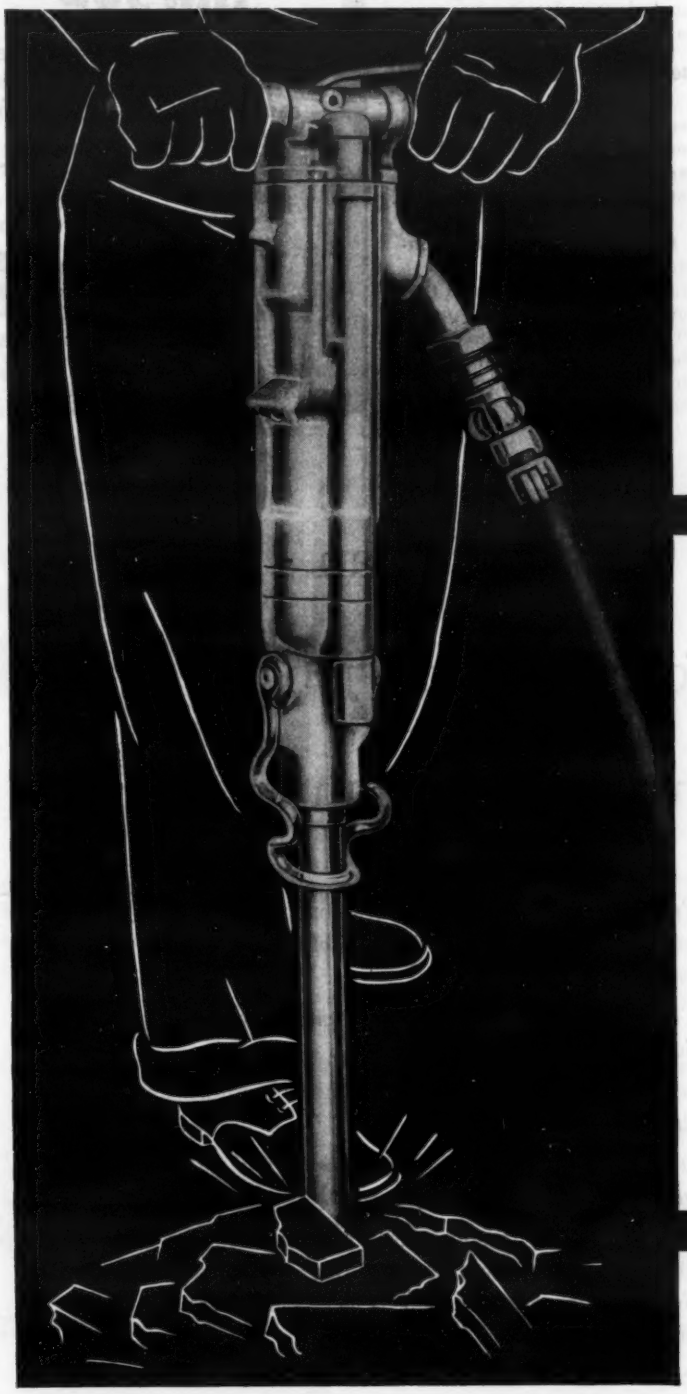
Idaho. Governor Gossett recommended spending no money except for necessities and said the State must keep its highways and other projects from deteriorating.

Montana. Governor Ford said the Highway Commission's program calls for the expenditure of $47,000,000 in the first three post-war years, and that the State would be able to match all Federal-Aid in carrying out the first year's program, although gas-tax revenue would not be sufficient therefor. He asked consideration of a provision for financing a long-term highway program, and recommended a $12,000,000 bond issue to match Federal funds. These bonds would be payable from gas-tax revenue but would not require a gas-tax increase.

Nevada. Governor Carville reported that maintenance of the state highway system is on a par with pre-war years.

Utah. Governor Maw asked for an increase of the gas tax from 4 to 5 cents without any exemptions and that the proceeds of the extra cent be spent on secondary roads. He suggested the defeat of the anti-diversion constitutional amendment and defended the use of some motor-vehicle funds by the Publicity and Industrial Development Department as necessary for post-war industrial expansion.

Wyoming. Governor Hunt said the Highway Department has available for matching purposes in excess of $5,000,000. He urged the addition of two or more members to the Highway Commission and renaming it State Highway-Aviation Commission, and asked that the Highway Department agency be utilized in airport construction work.



streamlined design . . . minimum kick back!

CP-115 DEMOLITION TOOL

WEIGHING only 59 lbs. with latch type retainer, the new CP-115 Demolition Tool gives outstanding performance for medium weight tool. Valve actuated, it operates with smooth efficiency — and minimum kick back. Full cushioning eliminates need for side rod springs — protects front head from punishment in "breaking through". Added safety feature is a gooseneck air inlet, so placed that swing of hose cannot catch operator's hand. Write for full data on the new CP-115 Demolition Tool.

CP-115 Demolition Tool is one of a complete line of CP Demolition Tools, Rock Drills, Sheeting Drivers and Spike Drivers. Write for detailed information.

★★★★★★★★★ PNEUMATIC TOOLS ELECTRIC TOOLS HYDRAULIC TOOLS ROCK DRILLS

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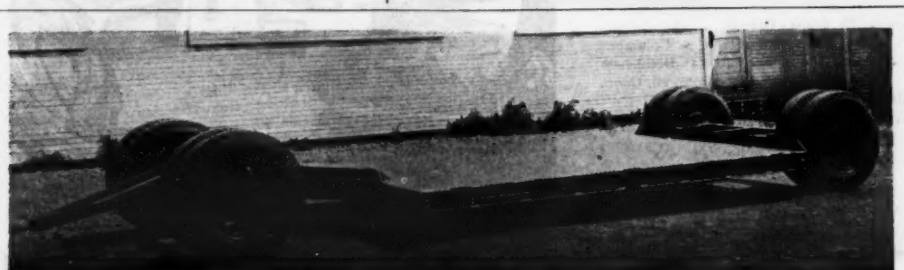
★★★★★★★★★ AIR COMPRESSORS VACUUM PUMPS DIESEL ENGINES AVIATION ACCESSORIES



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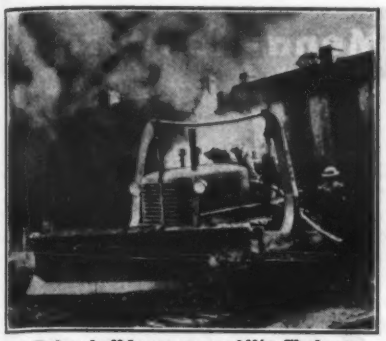
—4 models—
7, 10, 15 & 20-ton capacities

Don't say, "We want a TRAILER." Say: "We want a MARTIN Trailer."—This will insure your getting a trailer that's EASY LOADING, POWERFUL, FAST, SAFE, LONG-WEARING and ECONOMICAL.....
Sold by all Caterpillar Distributors.

WRITE FOR BOOKLET

Martin Machine Company, Kewanee, Ill.

★ Buy War Bonds
★ Save Waste Paper
★ Turn in Scrap Metal
★ Be a Blood Donor
★ Pay only Ceiling Prices



A Baker bulldozer on an Allis-Chalmers tractor recently saved the day for an English village by stanching the flow of burning gasoline from a storage tank which had been bombed by a Nazi plane.

Bulldozer Fights Fire For Army in England

The quick work of an American soldier driving a tractor and bulldozer saved an English village recently from being engulfed in a flood of flaming aviation gasoline. A storage tank containing thousands of gallons of gasoline located on an English hillside received a direct hit from an enemy bomb, releasing a torrent of flame over half a mile of countryside. The burning gasoline, flowing at about 1,000 feet a minute, threatened to destroy the village while volunteer firemen endeavored to check the holocaust.

The American soldier, seated on an Allis-Chalmers tractor equipped with a Baker bulldozer, sensed the desperate situation, dropped the big blade and began scraping up and piling dirt to create a dam. He risked his own life freely in the task, for his first earth accumulations were dumped fairly in the flaming stream, and the area above him on the slope was a blazing inferno. He continued his attack until he had erected dams which diverted the blazing gasoline away from the village.

The dams broke through in places under the pressure from the burning gas and the water, but these breaks were promptly repaired by the local fire fighters. By working without a stop until the flames were finally extinguished, the bulldozer and the fire fighters saved not only the village, but also other gasoline stores which were located farther down the slope.

Treating Aggregate For Asphalt Mixes

An admixture for asphalt or tar mixes which is added to the cut-back in the field instead of being sprayed over the aggregate before it goes to the pugmill is now available generally. This admixture, Nostrip, eliminates the need for heating or drying aggregate, as bituminous materials with this admixture will coat and permanently adhere to any type of road aggregate regardless of whether the aggregate is wet or dry.

To prepare the cut-back with the admixture, 1,000 gallons of the cut-back is heated to application temperature in a distributor and 80 pounds of Nostrip poured in and circulated in the distributor for thirty minutes to complete the mixing. Following this, the treated cut-back may be applied at once as surface treatment, penetration, or run into drums for storage. Once mixed, the Nostrip does not settle out and can be stored indefinitely.

The producer claims that bituminous materials treated with Nostrip can be used during rainstorms, as the admixture prevents stripping. Further, in stabilization and road-mix work, it is reported to cut blading and mixing time by one-half and does not require the addition of lime or any other material to the aggregate, regardless of its hydrophilic qualities.

Complete information on the quality and advantages of this admixture for tar and asphalt will be found in literature which may be secured direct from Maguire Industries, Inc., Nostrip Division, 122 E. 42nd St., New York 17, N.Y., by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

LeTourneau Appoints New Service Managers

Cloyd W. Richards has been named Assistant Service Manager and Sam E. Beebe is now Manager of Service Engineers of R. G. LeTourneau, Inc., Peoria, Ill. Both are veteran staff members. Mr. Richards joined the organization in 1937 and, after serving one year in the Parts Department, became Service Publications Editor, with the responsibility of supervising technical maintenance and operations manuals accompanying machinery for the armed forces. Mr. Beebe has been with the company since 1937, and served in several positions before being promoted to Eastern Service Manager in 1942. He now assumes highly specialized research duties in connection with shop and test farm work in the United States and Canada.

Diesel Engine Runs On Any Type of Fuel

As the result of experimentation which began in 1928, The Cooper-Bessemer Corp., diesel-engine manufacturer of Mount Vernon, Ohio, has announced the successful operation of a natural-gas engine on the diesel principle. This enables the unit to operate on a wide variety of fuels including fuel oil, natural gas, manufactured and coke oven gases, sewage gas, and refinery by-products without any electrical sparking device, and with a reduction in fuel consumption of from 20 to 25 per cent, it is reported.

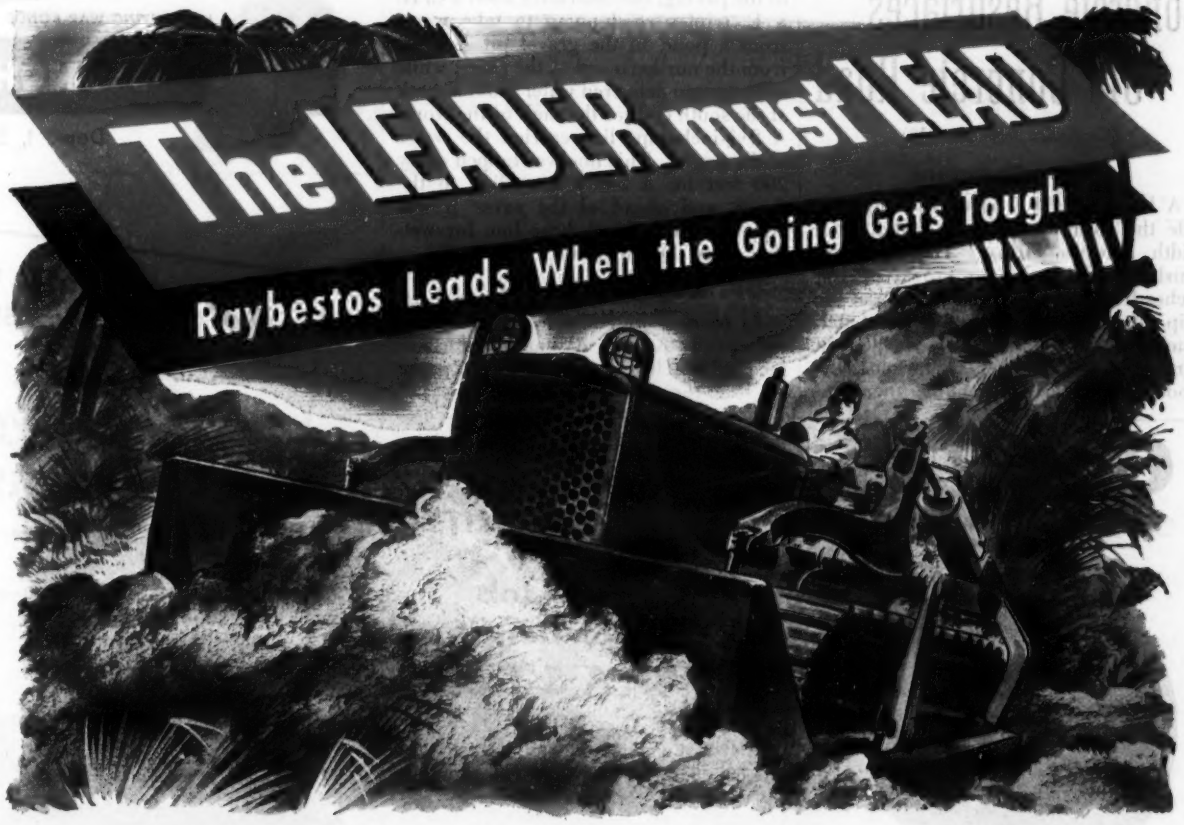
The conversion from liquid to gas fuel is done by closing one valve and opening another with the engine operating continuously at full load, according to Ralph L. Boyer, Chief Engineer of Cooper-Bessemer. The new principle enables the engine to have the same fuel economy regardless of the type of fuel used. It raises the normal 25 per cent thermo-efficiency of the gas engine to the 35 per cent thermo-efficiency common in diesel oil engines.

Further information, applications, and details may be secured direct from Cooper-Bessemer by mentioning this news item.

New Jersey Distributor For American Photocopy

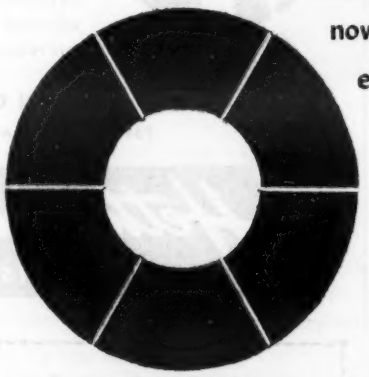
The appointment of Carroll B. Kelley by the American Photocopy Equipment Co. of Chicago, Ill., as field representative in Trenton, N. J., and the surrounding territory has been announced recently. His headquarters will be at 79 Rock Road, Glen Rock, N. J.

Mr. Kelley was formerly instrument tester for the Eclipse-Pioneer Division of the Bendix Corp., and later representative for the Von Hoffmann Corp. of Newark, N. J. Because of his experience, he will give service instructions in the use of the A-Pe-Co photo-copyer and will demonstrate new photographic copying methods for war plants and war-supporting activities.



It stands to reason that Raybestos Friction Materials which control the 1000 h.p. of an army tractor operating on the world's toughest terrain, will control any industrial equipment ever built or ever likely to be built. ★ The same Raybestos engineering leadership, and even many of the same materials, that have successfully met war's "impossible" friction demands, go into the new and improved Raybestos Industrial Friction Materials now available for you. ★ The leader must lead. Raybestos experience gives you products that lead in performance and service.

THE RAYBESTOS DIVISION of *Raybestos-Manhattan, Inc.*, BRIDGEPORT, CONN.



Ray-Metl Master Clutch Facing for Tractors. A composition of asbestos and fine metallic powder.

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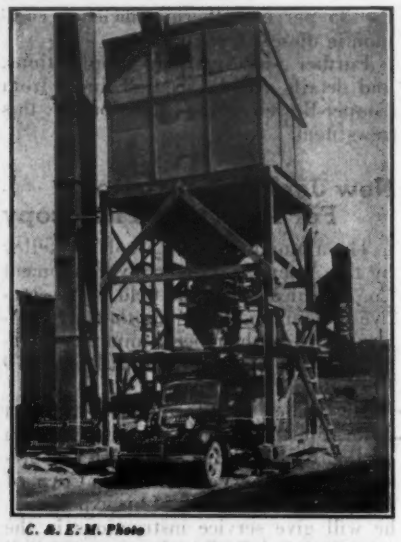
INDUSTRIAL FRICTION MATERIALS

BUY ANOTHER BOND

MANUFACTURING THE MOST COMPLETE LINE OF HIGHEST QUALITY METALLIC AND NON-METALLIC BRAKE LININGS AND CLUTCH FACINGS FOR EVERY TYPE OF EQUIPMENT, WAR AND CIVILIAN. ALSO FAN BELTS AND HOSE.



C. & E. M. Photo

Two spouts from two cement batchers in this Butler plant of L. G. Arnold, Inc., deliver the cement simultaneously to the two batches in the truck below.

Concrete Resurfaces Old Concrete Road

(*Continued from page 12*)

Paving Operations

A Koehring 34-E paver working outside the forms poured the full 22-foot width between forms. The slab was finished with a circular crown of 1¼ inches from the center. One man at the skip of the paver dumped the batch trucks while four puddlers helped in spreading the concrete. A Jaeger-Lakewood double-screed machine then finished the concrete which was vibrated along the forms, along the center joint, and at the expansion joints. Transverse bituminous contraction joints 4½ inches deep and ⅛ inch thick were installed at 20-foot intervals by machine. A Koehring Longitudinal Finisher was used to smooth the surface after the contraction joints were installed.

Two hand finishers used 10-foot drag straight-edges to remove any high spots and then pulled a canvas belt across the pavement, after which they broomed the surface to give it a slightly corrugated finish. This was followed by a Flexible Road Joint striping machine, operated by one man, which put down a 6-inch stripe of black oxide in the center of the road to act as a traffic marker. This machine, which rode the forms, applied the pigment at the rate of not more than 3 pounds per 100 linear feet. A Kohler 3,000-watt portable light plant with four reflectors furnished light for the work of the finishers when darkness overtook them.

Water for the concrete came from two sources: when working the northern half of the paving, the contractor used a C. H. & E. triplex road pump to take water from a pond in the gravel pit ½ mile from the northern end of the road; while a Rex pump delivered water from a creek at the south end for that half of the work. A 2½-inch pipe line carried the water to the paver. This line was tapped every 200 feet for a 2-inch hose line to the paver, and ahead of the paver it was tapped with a 1-inch hose line for wetting down the subgrade.

Curing the Concrete

As soon as the concrete had hardened sufficiently to prevent marring the surface, a 12-inch-wide roll of butcher paper

(*Concluded on next page*)

Clamp-Splice-Tie-Mend-Reinforce with PUNCH-LOK Streamlined BANDING METHOD

Punch-Lok Clamps, quickly applied with the Loking Tool, save money and time in your production and maintenance operations. Send now for descriptive catalog and name of nearest distributor.

KEEP BUYING WAR BONDS

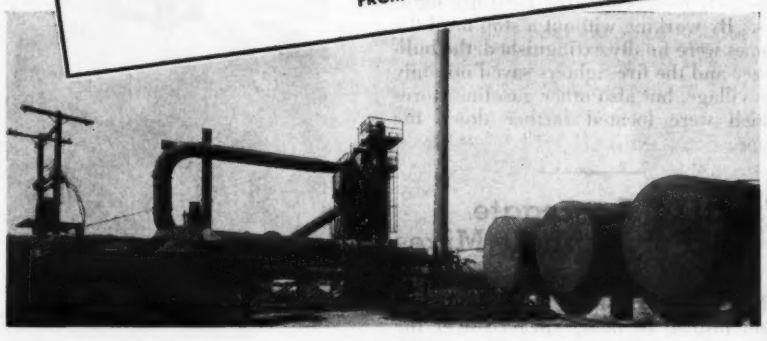
PUNCH-LOK COMPANY

Dept. I, 321 No. Justine St., Chicago 7, Illinois

CHECK THESE REFINEMENTS IN PORTABLE ASPHALT PLANT DESIGN

LARGER FAN • NEW HORIZONTAL CYCLONE DUST COLLECTOR • NEW TYPE SCREEN • REDESIGNED DUCT SYSTEM

— FROM DRYER TO DUST COLLECTOR AND FROM DUST COLLECTOR TO EXHAUSTOR



● In addition to the refinements in design listed above, this portable Hetherington & Berner plant also has a unit assembly of the exhaust fan, motor which drives the dryer, and the speed reducer—mounted on a separate platform. This decreases the length of the dryer unit, and greatly facilitates handling. The new type of screen reduces the overall height of the plant without reducing bin capacity. Complete information on this more efficient portable asphalt plant will be furnished on request.

H&B ESTABLISHED 1867

HETHERINGTON & BERNER INC.

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Hetherington & Berner

FOR BEST RESULTS . . . HOT MIX — BATCH MIX

CLEVELANDS' . . .

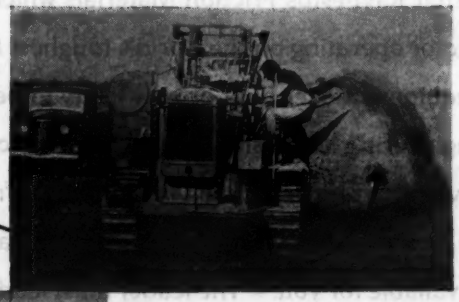
SPEED — MOBILITY — MANEUVERABILITY

Get Them to the Job and Get the Job Done FASTER

←CLEVELANDS' Compactness and eliminated Dead Weight afford full truck or trailer Mobility.

CLEVELANDS' Speed results from its numerous Graduated Crawler and Wheel Speed combinations, plus its High Capacity Digging Wheel . . .

More Dirt Off the Conveyor is Proof



←CLEVELANDS' Maneuverability is due to its simplified Brake Controlled Differential Steering. Full speed range in either direction and balanced weight distribution.

You'll find that in CLEVELANDS every operation incidental to mechanical Trenching has been speeded up, assuring you most trench, in most places at least cost. That's why you'll want CLEVELANDS on your Postwar Jobs . . .

CLEVELANDS MAKE THE EARTH FLY

THE CLEVELAND TRENCHER CO.

20100 St. Clair Ave., Cleveland 17, Ohio

Jap Peace Term for the U. S.

"Steel and oil production to be permitted on a reduced scale only."

★ ★ ★

ARE YOU BUYING YOUR SHARE OF BONDS?

Concrete Resurfaces Old Concrete Road

(*Continued from preceding page*)

was unrolled longitudinally down the center of the pavement to cover the center striping. Then four rolls of impermeable curing paper, 84 inches wide x 500 feet long, were also unrolled, overlapping each other and completely covering the pavement. Earth from the shoulders was then placed along the laps of the paper to keep it in place and the paper was left on for 72 hours. At the end of the curing, the paper was removed, and the road was swept by a Littleford power broom after the concrete had reached the required strength.

After curing, the pavement was tested for smoothness by pushing a pavement tester longitudinally over the road in four locations: 2 feet from the edge and 2 feet from the center on each side. This roughometer is a 4-inch aluminum I-beam, 10 feet long, with a wheel on each end and a plow handle on one end with which it can be pushed. Three bolts are inserted in the bottom of the I-beam at 2½-foot spacing and ⅛ inch higher than the bottom of the wheels. Thus, the bolts make a scratch in the pavement whenever a bump that is ⅛ inch or greater in height is encountered. The contractor was penalized the cost of one square yard of concrete paving for every variation greater than ⅛ inch in each wheel lane.

Shoulder Grading

Grading of the shoulders was done, after the paving operations were completed, by five LeTourneau 12-yard scrapers, each pulled by a Caterpillar RD8 tractor. In taking material from the borrow areas, the scrapers were assisted in loading by a Caterpillar RD8 pusher tractor. After hauling the material to the shoulders, they spread the material in 3-inch layers assisted by a Caterpillar RD7 tractor with bulldozer. The power graders on the job did the finish grading.

Major Quantities and Personnel

The contract for this work was awarded to L. G. Arnold, Inc., general contractor of Eau Claire, Wis., on its low bid of $325,839.22. A subcontract for the drainage structures was given to H. Mass Co. of Algonquin, Ill., which built six reinforced-concrete box-culvert cattle passes and a reinforced-concrete girder bridge with a 50-foot span and abutments 36 feet long and 1 foot thick.

The major items included:

Earth excavation	82,893 cu. yds.
Borrow excavation	18,057 cu. yds.
Granular borrow	33,195 cu. yds.
Concrete pavement	68,635 sq. yds.
Earth shoulders	58,967 sq. yds.
Pavement removal	17,294 sq. yds.
Class X concrete	838 cu. yds.

Work on this 5.2-mile concrete paving contract on U. S. 14 south of Harvard, Ill., was started July 20, 1944, and was finished December 12, using 120 men including truck drivers. This project of the Illinois Division of Highways, Wesley W. Polk, Chief Highway Engineer, was in District No. 1 of which R. T. Cash is District Engineer, with headquarters at Elgin. Walter Swanke was Project Manager for the contractor and Frank Griffith was Paving Superintendent. The earth-moving equipment used by L. G. Arnold, Inc., contractor for the project, was the property of Roger Van Vechten, contractor, of Wauwatosa, Wis.

C. & E. M. Photo
The shoulders along the 5-mile concrete paving contract on U. S. 14 near Harvard, Ill., were finished by LeTourneau 12-yard scrapers.

New Mortar Cement

A new mortar cement, described as the result of years of research, including field studies, investigation of raw materials, laboratory tests, and the development of manufacturing methods, has just been announced by the Universal Atlas Cement Co., New York City, and is now ready for shipment from all of the company's plants.

According to the producer, Atlas mortar cement is plastic and smooth, spreading and troweling easily. Among its other features are the amount of mortar produced by a bag of cement, making its use economical and efficient; its low volume change; color properties acceptable to the trade; durability in accord with a quality cement; and strength to meet all requirements.

The producer also states that Atlas mortar cement complies with the specifications for masonry cement of the Federal government and the American Society for Testing Materials.

One-half of all Ohio rural pedestrian accidents in 1942 occurred between 6 p.m. and midnight, and 75 per cent between 6 p.m. and 6 a.m., according to Harry Neal, Ohio Chief Traffic Engineer.

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U. S. Army Air Forces Photo

An example of an island turned almost completely into an airstrip is Middleburg, off Cape Sansapor in Dutch New Guinea on the road to the Philippines. Aviation Engineers have cleared literally all the island for taxiways and revetments.

Electric Power Units

Portable electric power plants mounted on wheels or skids and producing sufficient power for contractors' use on construction projects are described in new 2-page bulletins recently issued by Electric Tamper & Equipment Co., Ludington, Mich.

The Jackson WS-8 power plant, a 110-volt 3-phase 60-cycle ac or 110-volt single-phase 60-cycle ac plant producing 5 kva, is described in Form WS-8-9-42. The V-3 power plant, designed particularly for emergency work and general floodlighting, produces ¾ kva and is a 110-volt 3-phase or single-phase ac unit. It is described in Form V-3. The WS-4 portable power plant is designed for railroad track maintenance as well as for contractors and bridge builders. It produces 2 kva, 110-volt, 60-cycle ac, which is plenty of single-phase power for lights, drills, saws, etc. It is described in Form WS-4-443.

Copies of any of these bulletins may be secured direct from the manufacturer by mentioning this item.

Data on Light Gages Of Structural Steel

An illustrated 24-page booklet "Technical and Commercial Developments in Light Gage Structural Steel", containing an address by Milton Male, Research Engineer, United States Steel Corp. of Delaware, has recently been issued by the American Institute of Steel Construction, 101 Park Ave., New York 17, N. Y. It is an interesting historical treatise on the developments in this field, with many illustrations of applications of light gage structural steel shapes.

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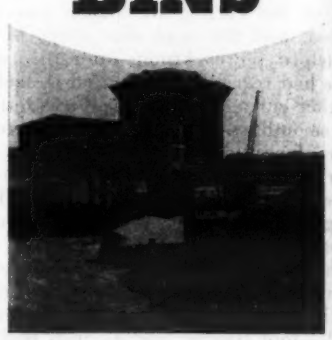
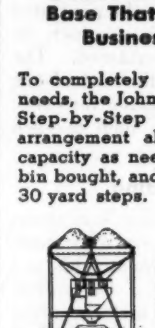


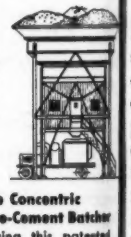
Create a Precision Mix Plant Base That Grows With Your Business Step-By-Step

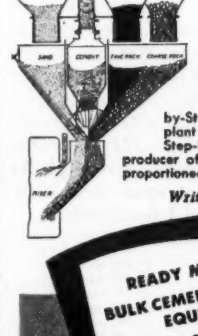
To completely meet your changing bin needs, the Johnson line offers the famous Step-by-Step Bin arrangement. This arrangement allows for enlarging bin capacity as needed by keeping the first bin bought, and adding capacity to it by 30 yard steps.



Here is shown the basic 30 yard bin to which 30 yard addition (right) has been made to make 60 yards capacity. The 30 yard bin is for 2 materials. The expanded 60 yard takes 2, 3 or 4 materials.

This is the 30 yard bin stepped up to 120 yards. The original fabrication always provides for the increased capacity whenever that may become necessary. This means bin expansion at an absolute minimum of time and costs.





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Bituminous Macadam Salvages Pavement

Elmgrove Road West of Rochester, N. Y., Repaved With Two-Course Mix by State Maintenance Crew

♦ A 2½-mile section of old bituminous-macadam pavement on Elmgrove Road, N. Y. State Highway 1481, just west of Rochester, N. Y., which connects U. S. 104 with the paralleling east-west State Route 31, was resurfaced in August, 1944, with a two-course bituminous macadam, New York State Department of Public Works Specification "Mixing Method Type 3". The work was done by the maintenance forces of District 4, with the black-top material supplied at the site under contract with Michael E. Sweeney of Rochester.

The original pavement on Elmgrove Road was a 16-foot-wide penetration macadam which was widened to 20 feet in 1940 by the addition of a 2-foot strip of macadam on each side. Exceptions to this are a ¼-mile stretch which had a two-lane 20-foot concrete pavement and about 100 feet on each side of intersections where the original pavement width had been increased to 30 feet.

The New Pavement

Since the job site is in open country, the old pavement which serves as the sub-base was comparatively clean, and needed only to be swept with hand brooms before the hot-mix base course was laid. Six Sweeney-owned trucks of 10-ton capacity hauled five 2-ton batches per load 8 miles from the asphalt plant in Rochester to Elmgrove Road. After each trip the steel bodies of the trucks were swabbed with mops soaked in kerosene. An average of 325 tons of material was hauled a day.

The mix was laid by a state-owned Adnun Black Top Paver in two 10-foot strips so that traffic could be maintained on the half width of roadway not under construction. The 10-foot screed on the paver was so adjusted that the base-course thickness was 2¾ inches loose which was compacted to a 2-inch thickness by two 10-ton 3-wheel Acme steel rollers, also owned by the state. A single truckload of hot-mix furnished enough material for a 10-foot lane of base course 75 feet long.

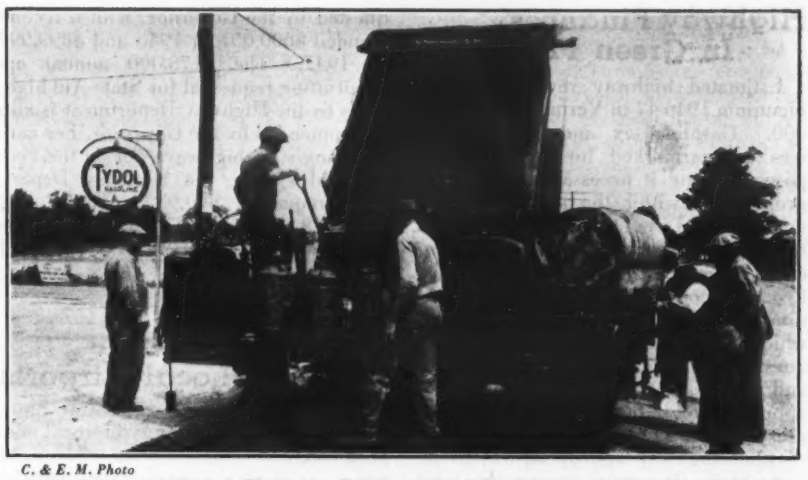
The trucks were backed against the paver and the load dumped as required to keep the bin full at all times as the paver moved forward, pushing the truck ahead. Two men were required to shovel the material dumped from the 8-foot-wide truck body into the corners of the 10-foot spreader. A 10-ton load was placed in less than ten minutes. Adjustments in the depth of the spread of the bottom course were made as the equipment moved along to allow for the unevenness in the old pavement so that the finished bottom course would be as smooth and even as possible.

Generally, the rollers did not move onto the freshly placed pavement until several truckloads had been dumped, in order to permit a longer run of the rollers, thus making unnecessary the stopping and reversing of the roller more than once at the same spot, with the possibility of forming an uneven place in the pavement. On the bottom course, one half the width was laid one day and the opposite half the next day. However, with the top course, to prevent a visible separation mark in the finished pavement in the center of the road, both sides were laid the same day with the ends of the two sides as nearly even with each other as possible.

Stress was laid on having enough water available to keep the wheels of the rollers and paver dripping wet at all times. A 300-gallon water tank mounted on a truck chassis was pulled around by a 2½-ton state-owned Brockway utility truck, supplying 1,200 gallons of water a day to the equipment. The paver was rigged with an extra barrel so that stoppages for taking on water for its rolls were reduced. A Wisconsin-powered Gorman-Rupp 2-inch pump carried by the utility truck was used for pumping the water from the supply tank to the equipment.

A crew of twelve men and General Maintenance Foreman Peter Arena started work on August 8 and completed operations in three five-day weeks. The forces included two roller and one paver operators; two flagmen; two men shoveling material into the paver; two men, one at each side of the paver, for final screed adjustments; two rakers who edged the pavement to keep it straight; and one laborer at the water-supply pump.

(*Concluded on page 86*)



C. & E. M. Photo

State forces reinforced Elmgrove Road, west of Rochester, N. Y., with plant-mix bituminous macadam furnished by contract and laid by a state-owned Adnun Black Top Paver.

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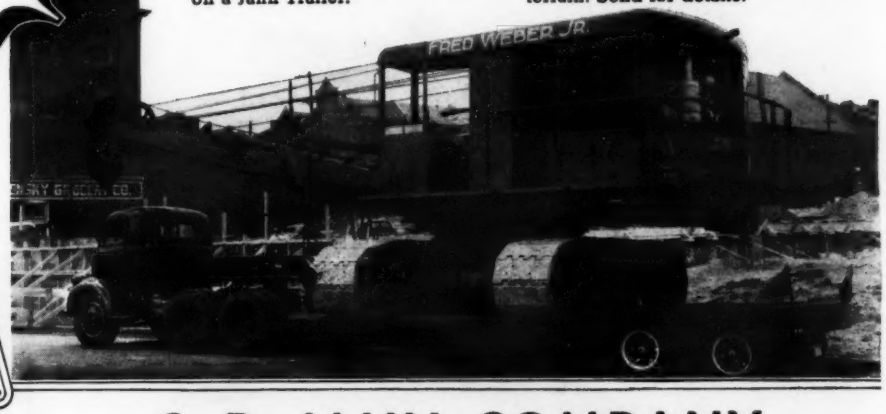
. . . save time and money between jobs!

JAHN Heavy Duty Trailers are the answer to quick movement of heavy equipment from job to job assuring more profitable operation by reducing idle time. There's a full range of sizes with any wheel or axle combination. All models are easily and quickly convertible from full to semi-trailers. Whether your load weighs 5 or 100 tons you can move it safely and quickly on a Jahn Trailer.

The new hydraulic brake application developed by Jahn engineers increases the safety on all loads because of smoother, faster braking action with positive, equal brake pressure on all wheels. Unlimited axle oscillation is permitted without affecting braking action There's no possibility of partial application or dragging of brakes when operating over rough terrain. Send for details.



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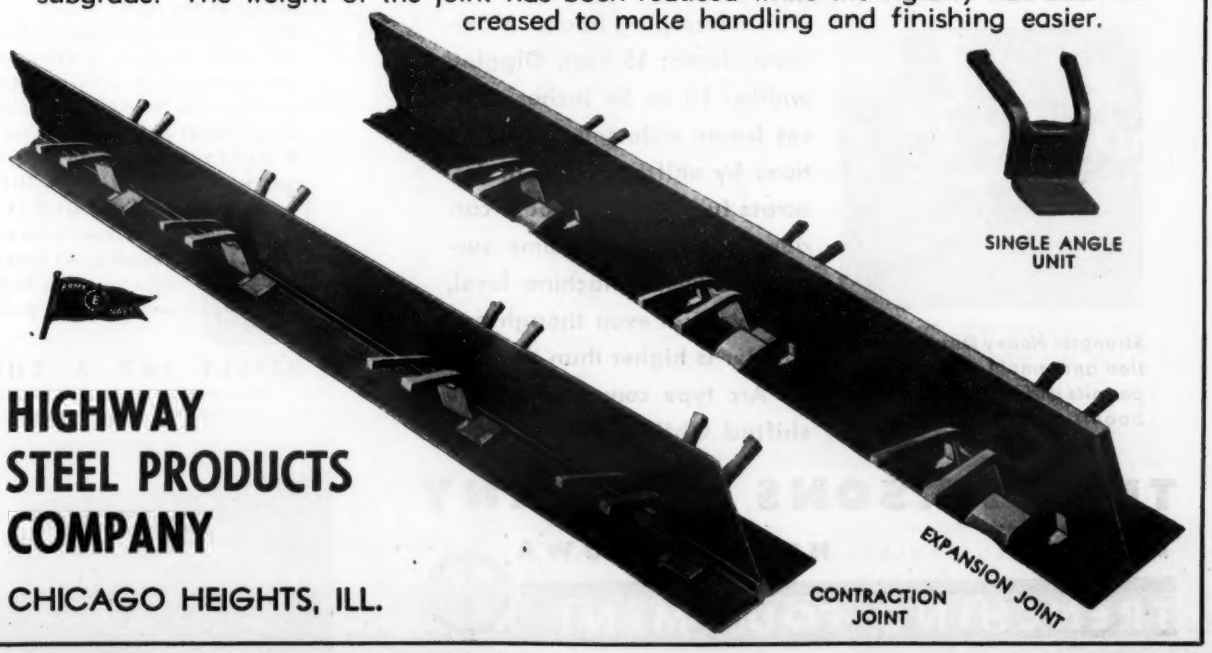

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Highway Finances In Green Mtn. State

Estimated highway revenue for the biennium 1946-47 in Vermont is $9,346,000. Gasoline tax and motor-vehicle fees are earmarked for highway purposes, making it necessary to keep appropriations within the amount of revenues expected from these two sources. In his budget message presented to the General Assembly, Governor Mortimer R. Proctor recommended that an appropriation of $150,000 for State-Aid highways which the Highway Department requested for 1947 be made for both 1946 and 1947. The towns have received no appropriation in this category during the present biennial period.

Other highway appropriations to be restored in Vermont during the next biennium are the Federal-Aid construction appropriation, State-Aid road construction, and construction on state highways not on the Federal-Aid system. An appropriation of $750,000 annually for Federal-Aid construction has been requested by the Governor, with a recommended $600,001 in 1946 and $899,999 in 1947. The $175,000 annual appropriation requested for State-Aid highways by the Highway Department is also recommended by the Governor. For constructing state highways not on the Federal-Aid system, the Highway Department requested $49,932 in 1946 and $191,328 in 1947. The Governor has recommended $49,932 in 1946 and $41,329 in 1947.

Air Transportation And Local Airports

Readers of CONTRACTORS AND ENGINEERS MONTHLY serving on local airport committees of counties, cities, and towns, or of civic organizations, will be interested in an unusually well prepared statement on airport planning which has recently been issued by Fay, Spofford & Thorndike, 11 Beacon St., Boston 8, Mass. This well known firm of consulting engineers has developed a very interesting 38-page thesis, with illustrations showing typical airport layouts, which may be secured by writing direct to the home office of these consultants and mentioning this review.

The bulletin covers passenger traffic, mail, and air express as well as freight, followed by a statement of the relation of the Federal government to air transport, the responsibility for providing airports, a discussion of the method of estimating airport requirements for a particular community, and the subjects of airport planning and costs. An outline of the methods of initiating airport projects conclude this report.

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Thousands of ACLC Safety Hoist Hooks are "going into service"—carrying heavier loads with utmost safety—at lower cost in time and equipment. The basic reason? ACLC Safety Hoist Hooks are not merely built—but ENGINEERED—geared to today's crying need for more efficiency. Note these features!

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- ★ Load is evenly distributed between safety shoulders and lip, giving extra load carrying capacity;
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- ★ Despite all these exclusive advantages, the ACLC Hoist Hook costs far less than ordinary hooks.

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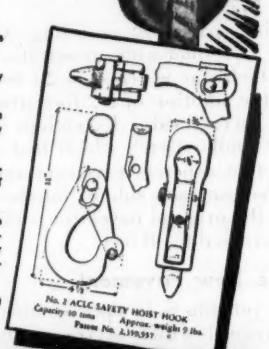

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Strength: Heavy Duty construction and ample engine power permits use of double or triple booms on the Parsons 310.

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Levee Repaired

(*Continued from page 2*)

slope was carried to Elev. 444, 4 feet above pool level. Here a 25-foot flat berm was left to the toe of the levee proper. A 1 on 3½ slope was built up to a 10-foot-wide crown with an average elevation of about 461. The new inside levee slope is also 1 on 3½. Design specifications required that a 5-foot layer of impervious clay be placed on the river side, while pervious sand was used on the land side to permit drainage.

Moving the Earth

The big gun in this earth-moving job was a Bucyrus-Monighan 5W dragline with a 120-foot boom and a Hendrix 6-yard perforated bucket. The upper stratum of soil along the flat lands between the river and the old levee was coarse sand or silt with an average depth of about 7 feet. The dragline stripped this material to build up the top and land side of the levee. Below the sand was a layer of silty clay, also averaging about 7 feet in depth, which was placed on the river side of the levee. The Monighan averaged from 2,500 to 3,000 cubic yards per 10-hour day on this work.

According to new specifications, all dry material placed had to be compacted by equipment weighing 10 tons and exerting a pressure of 6 pounds per square inch. This requirement was met by using two Caterpillar RD7 tractors equipped with 10-foot bulldozer blades. Even without the bulldozer, each tractor produced a compaction weight of 6.3 pounds to the square inch. The dry material was placed in 1-foot layers which were spread and compacted by the tractor-bulldozers traveling back and forth at least three times over each square foot of fill. Hydraulic fill or any material taken from below water did not have to be compacted. When the levee had reached specified elevation, the slopes were given a final shaping by a Northwest dragline with 1½-yard bucket on a 65-foot boom working along the top of the levee. This dragline dressed about 500 linear feet per day on both banks of the levee. Other equipment on this project included two pick-up trucks which serviced the two big earth-moving rigs with fuel and water, and a Kohler 1,500-watt electric-light plant, driven by a 3-hp gasoline engine, for night work.

Hydraulic Fill

For the lower ¾-mile section of levee which carries the three tracks of the Peoria & Pekin Union Railway, it was necessary to pump hydraulic fill to get suitable material for levee construction, as only clay was available in Wesley Slough which lies between the river and the levee at this location. The diesel-electric hydraulic dredge America, owned by the American Aggregates Corp. of Greenville, Ohio, pumped 90,000 cubic yards of sand fill along the shore side of the levee. In this subcontract 3,000 feet of 16-inch pipe was used to convey the material from the river, where the dredge was working, across the flat marshes to the toe of the levee. An average of thirty men was employed as dredge crew and pipe-setting gang.

On this soft, marshy and unstable ground there was considerable settlement which necessitated a careful record of the amount of fill deposited, so that the contractor would be paid for all material placed and not just for the embankment that would appear on the final cross sections. To keep a record of settlement, five gages were built and placed in a line 500 feet apart before any hydraulic fill was pumped. The gages consisted of a 20-foot length of 2-inch pipe, one end of which was welded to the center of a 6-foot square piece of 5/16-inch boiler plate. These plates were anchored firmly in place with wire rope fastened to poles or trees. Elevations were taken on top of the pipes at the time of installation, and again after the fill had been in place for some time. The contractor had to pay for the construction and installation of these gages, but it was worth the expenditure as surveys revealed that the ground had settled on an average of one foot for a 150-foot width in a 2,000-linear-foot section. This represented over 11,000 cubic yards of material which would not have been paid for in the usual method of computing earth work on the basis of final survey sections.

As the hydraulic material had a natural slope of about 1 on 14, the fill had to be reworked by the Monighan dragline to shape it up to 1 on 3½ slopes. The big rig worked on top of the pumped-in sand which had become sufficiently firm so that no foundation platforms were necessary. The front of the levee in this section was built up to Elev. 461.3 which is slightly higher than the railroad embankment to the rear where the three tracks had been washed out in

(*Concluded on next page*)

C. & E. M. Photo

A Northwest dragline with a 1½-yard bucket, operating on top of the Illinois River levee at East Peoria, trimmed both slopes.

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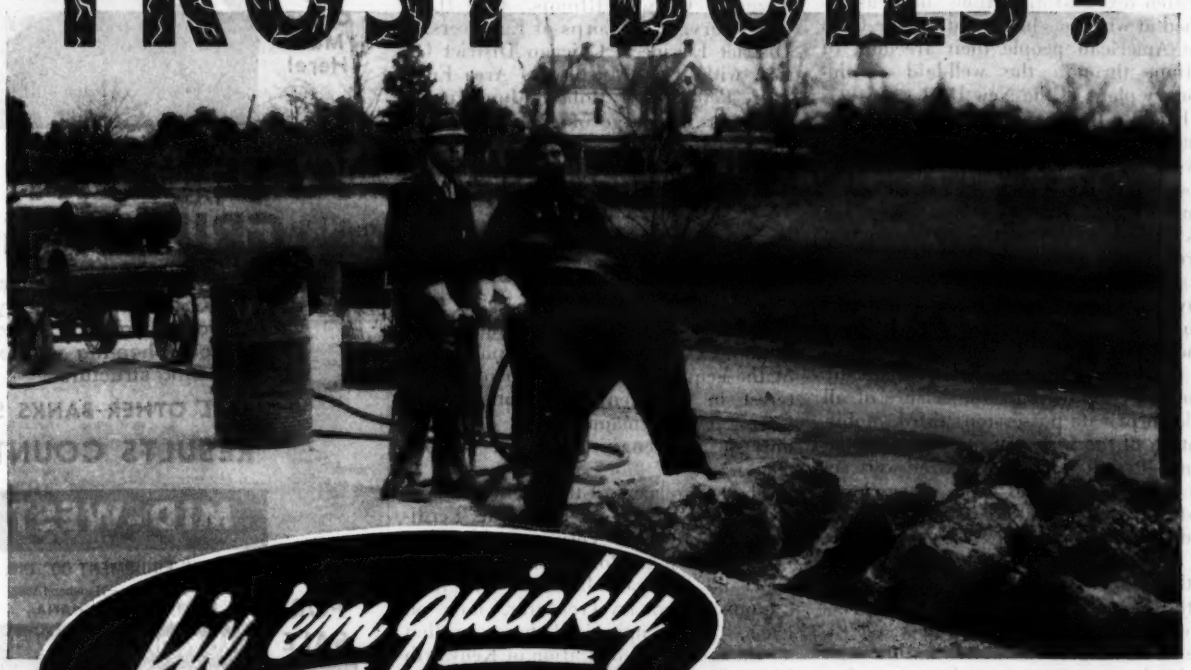

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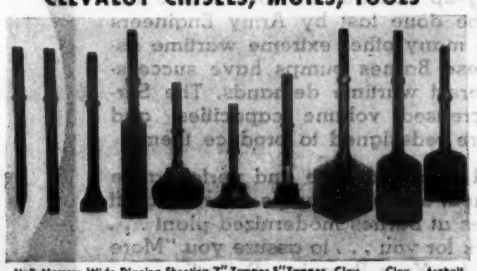

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C7

With the advent of spring thaws, you will need Cleveland Paving Breakers for emergency calls and hurry-up repair work.

Model C7 is best for the average job. It is an 80 lb. slugger, easy to hold. Two C7's can be run from a Number 85 compressor. For heavier work, try the C9, which is two pounds heavier but uses no more air. It is designed for breaking the hardest, reinforced concrete. For lighter work, trimming, etc., use the smaller C10, three of which operate from a Number 85 compressor.

Also be sure to select the proper chisels, moils, etc., from the "Clevaloy" line illustrated here. Bulletin 128 tells all about these Cleveland tools, and also contains many valuable hints on getting better service from your paving breakers . . . *Write for it!*

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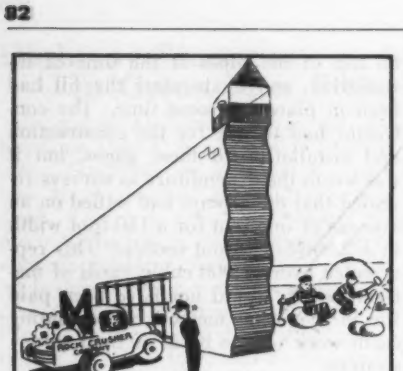

"We have a delivery for a Mr. Butch."

"The Revolution Was"; How Did It Happen?

A few weeks ago we received from a friend in the mid-west a pamphlet which should be read by every thinking American, and also by those who think they think. It is surely a thesis for the rugged individualist of the contractor and engineer group and is recommended for careful study. The title "The Revolution Was" carries the feeling of something that has happened. When one has completed reading the 51 pages of carefully written text and quotations, he is astonished at what has happened to take from the American people their freedom of action, through the well-laid revolutionary plans of the New Deal.

Briefly, the pamphlet discusses the nine steps by which this unrecognized revolution, but revolution nevertheless, has come about, chiefly with the acquiescence of the American people. First, the taking over of the control of government through the ballot, but by misleading terms to influence the voter in his action way back in 1932; second, seizure of economic power by the creation of an emergency and the closing of the banks by presidential decree, approved later by Congress, followed by the seizure of all gold in private possession; third, mobilization of the forces of hatred by propaganda so that symbols of hatred were set up in place of actual facts or people or systems; fourth, attaching the farmer and the industrial worker to the parade by improving their economic status, each without apparently harming the other; fifth, the shackling of business by overpowering Federal corporations; sixth, the weakening of the individual through Federal pampering; seventh, overcoming all rivalry to executive control in government, including the states, the Congress, the Supreme Court, and local self-government; eighth, creation of faith in a spiraling public debt; and ninth, making the government the great capitalist and economic power.

In conclusion, the author, Garet Garrett, states, "A government that had been supported by the people and so controlled by the people became one that supported the people and so controlled them. Much of it is irreversible. That is true because habits of dependence are much easier to form than to break. Once the government, on ground of public policy, has assumed the responsibility to provide people with buying power when they are in want of it, or when they are unable to provide themselves with enough of it, according to a minimum proclaimed by government, it will never be the same again."

Mr. Garrett, the author, is a well known political and financial writer, having served on the New York *Sun*, the *Wall Street Journal*, the New York *Evening Post*, and as Editor of the *New York Times Annalist*. He has written a number of books on political and economic subjects, as well as various essays in those fields. Most recently he was editorial-writer-in-chief on the *Saturday Evening Post*.

Copies of this pamphlet "The Revolution Was" may be secured direct from The Caxton Printers, Ltd., Caldwell, Idaho, postpaid for 50 cents a copy.

Levee Repaired

(*Continued from preceding page*)

the 1943 flood. This represents an increase of about 4½ feet in height at some locations above the 1943 level.

Ground elevation behind the levee is approximately 438, or about 2 feet lower than the normal elevation of the Illinois. The land in the rear drains toward the river, so ditches were dug paralleling the river front section and the P. & P. U. Ry. section of levee. These ditches drain to a pump house at the junction of the two levee sections where drainage water is pumped to the river through 18-inch and 24-inch boiler-plate pipes which had been placed in the embankment. At this point in the river where the current is swift and erosive the levee is reinforced for 250 linear feet with 1,200 square yards of riprap consisting of precast concrete blocks 12 inches square x 6 inches deep.

Work on the levee will be completed early in the spring of 1945 with the seeding of the slopes at the rate of 100 pounds to the acre.

Personnel

This 3.1-mile improvement of the Illinois River levee is located in the East Peoria Drainage and Levee District of Tazewell County, Illinois. Col. H. J. Woodbury, U. S. Corps of Engineers, is District Engineer, Chicago District Office, with L. P. Murphy as Area Engineer, Peoria, Ill. Robert Mundelius is Engineer in charge of construction for the Area and Russell McConnell was Resident Engineer on this levee-improvement project.

Pacific Car & Foundry Acquires Kenworth Truck

Announcement has been made by Paul Pigott, President of the Pacific Car & Foundry Co., Seattle and Renton, Wash., of the acquisition of the controlling interest in the Kenworth Motor Truck Corp., Seattle, manufacturer of heavy-duty specially engineered trucks and bus chassis.

The new officers of the Kenworth firm include: Paul Pigott, President; Ferdinand Schmitz and Vernon Smith, Vice Presidents; John Holmstrom, Vice President and General Manager; and John Cannon, Secretary-Treasurer, now on leave. It is emphasized, however, that no changes in the operation of Kenworth Motor Truck Corp. are planned for the duration, as both organizations will devote their efforts exclusively to fulfilling their respective war orders.

During peacetime, Pacific Car & Foundry makes Carco winches and other logging equipment, structural steel products of all types, bus bodies and other machinery, and alloy steel and special steel castings. The acquisition of the Kenworth firm will broaden its facilities to serve the transportation field.

Under the new relationship, it is stated that the combined organizations will be devoted, after the war, to the development of passenger-carrying motor coaches, oil vehicles, heavy-duty contractors' trucks, and highway transport vehicles.

Another Griffin Wellpoint Job—

BEFORE . . . A QUAGMIRE
18 ft. of water—saturated silt!

NOTE GRIFFIN WELLPOINT LINE

AFTER—DRY AND FIRM . . .
GRIFFIN GETS RESULTS

In the lower photo note that the crane mats were put aside after the Griffin Wellpoint System had stabilized the subgrade. Crane works right on bottom 19 feet below original water level. Steel Sheeting was eliminated except where specified at the existing structure.

ALL OTHER BANKS SLOPED—A REAL SAVING
RESULTS COUNT—WHY SAY MORE

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548 Indiana Street Hammond 1662
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GRIFFIN WELLPOINT CORPORATION

MORE GALLONS OF WATER FOR YOUR PUMPING DOLLAR . . .

That's your performance promise from the amazing new stream-styled line of Barnes Automatic Centrifugals. Based on proven wartime experience . . . gruelling ship salvage requirements by the Navy, tough hurry-up construction jobs where dewatering had to be done fast by Army Engineers and Seabees, and many other extreme wartime assignments . . . these Barnes pumps have successfully met the severest wartime demands. The Services needed increased volume capacities, and Barnes pumps were redesigned to produce them.

A new standard in appearance and performance has been established, and now pumps are rolling off the production lines at Barnes modernized plant . . . ready to go to work for you . . . to assure you "More Gallons of Water for Your Pumping Dollar".

DISTRIBUTORS: If you are looking for a "hot" line, with vigorous hard hitting selling support, contact us immediately. A number of territories are still available. Write, wire or phone.

ARMY NAVY

BARNES MANUFACTURING CO.
Quality Pump Manufacturers for Nearly 50 Years
MANSFIELD, OHIO

Contract Bonds

(*Continued from page 46*)

the surety company you are going to remove the equipment from the job, which is indeed a very potent weapon. Equipment dealers have told me that as a rule if they have credit losses it is due to the fact that through stress of competition they have violated their own rule or yardstick in the extension of credit. The surety bond never was intended to take the place of your credit department, and to say you are better off without a bond is just as unsound as to say that you would be better off if the contractor was prohibited from borrowing money from a bank to finance the job.

"A contractor's financial statement disclosing adequate working capital with a margin of safety is indispensable. Inadequate capital has caused more trouble than any other source, but unless the contractor has the proper price the work cannot be completed without loss to the contractor and may involve the surety.

"A bondman can help the equipment dealer. The qualified bondman as a rule is very close to the contractors, knows their financial responsibility, and their equipment requirements.

"The experienced surety underwriter endeavors to make the business safe for himself and in doing so is making it safe for everyone—the contractor, the equipment dealer, and the material man.

Handling Claims

"One of the great difficulties in promptly handling claims is the failure of the creditors to establish conclusively the job or project to which the material or parts were furnished. In many cases your claims have been delayed and sometimes questioned because of your failure to keep accurate records of the job to which the items or work should be charged and I would like to suggest that each and every one of you makes sure that your accounting records are so set up that the bills can be properly identified as to the particular contract or job. If you do this, you will be able to present your claim more promptly and you will not be asked to take a discount which is sometimes asked when you are unable to allocate your bill to a particular job. On large contract cases, surety companies reinsure or sell part of the risks to other surety companies, and if a contractor has three or four jobs going at the same time there will be different companies guaranteeing the payment of the bills. It is, therefore, necessary that your records be kept so that you can establish without question the job to which your bill applies.

"The qualified agent for the surety company is in exactly the same position in the insurance industry as the equipment distributor is in the equipment industry—both are middlemen who justify their existence in the service they perform for their respective customers."

The standard prequalification procedures of most state highway departments and the invaluable services of the Bureau of Contract Information, which is constantly supplied with data by surety companies and others, have aided all parties, including all responsible contractors, in eliminating fly-by-night and inexperienced construction organizations. These have done much to stabilize the construction industry, so that the surety bond becomes a greater asset in that it protects against unexpected financial hazards.

WELLMAN
Williams
BUCKETS
Longer Service . . .
Less Maintenance

Welded construction makes the difference! Multiple Rope, Power Arm and Power Wheel and Dragline buckets, 3/8 to 16½ yd. capacities.

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THE WELLMAN ENGINEERING CO.
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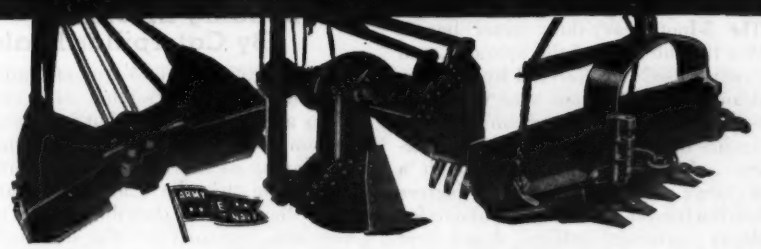
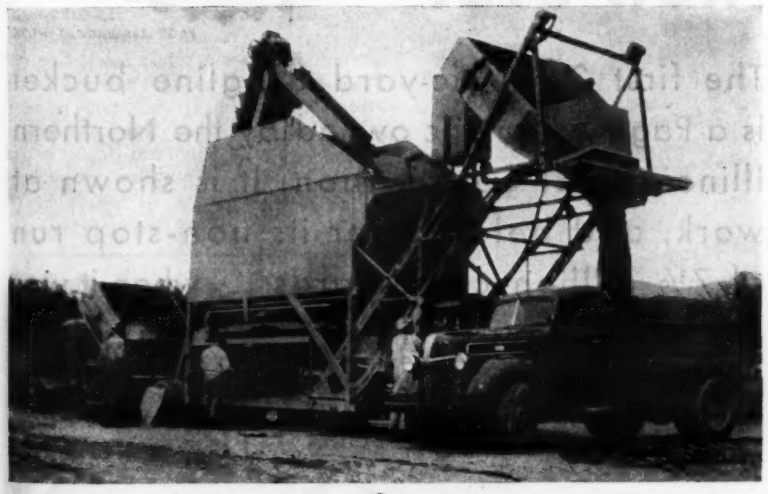
Sales and Service Agencies in Principal Cities



AT LAST . . . A BATCHING PLANT WITH
REAL PORTABILITY



NOBLE

Fully Portable BATCHING PLANTS

HERE'S a high-capacity batching-plant (100 tons per hour) with every desirable feature of a permanent set-up, *plus* the profit-making feature of *true portability*. Quickly and cheaply moved, NOBLE Fully Portable wheel-mounted plants can be located close to *every* job to cut aggregate and batch hauling costs, speed production.

Write or wire for information on the complete line of NOBLE batching Plants.

NOBLE CO. 1860 SEVENTH STREET · OAKLAND 7, CALIFORNIA
AUTOMATIC SCALES • AGGREGATE BATCHING PLANTS • ELEVATORS
CONVEYORS • BINS • SILOS • TUNNEL FORMS • "PRESS-WELD" PLACERS

This "HIGH PRIORITY"
ORDER for OSGOODS
CAN'T WAIT!

This Fighting Osgood 20 might have been yours! But it's needed for an important job near Aachen, Germany, making it necessary to "back-order" your new equipment for a while yet. And other Osgoods that might have been yours are needed almost everywhere you might touch a map. In fact, they're needed—and being delivered—wherever dirt must be moved to wage war. Int. News Photo

Osgood has delivered over 1000 power shovels to the Army Engineers alone since Pearl Harbor. Rugged outfits for rugged service, many of them are in crucial "headline" battle actions, where a road must be built . . . an airstrip leveled . . . a beachhead landing pier finished . . . or a street cleared . . . before the issue can be settled. Under such conditions, there can be no substitute for speedy, efficient Osgood dependability—because *these jobs can't wait.*

Meantime, the Osgood *you're* patiently waiting for will be a better machine for the waiting—ready to deliver profit-making performance equal to the vast peacetime tasks ahead.

SHOVELS • CRANES • BACKHOES

OSGOOD
THE OSGOOD COMPANY • MARION, OHIO

Jap Peace Term for the U. S.

"All naval air bases and air installations to be destroyed, except those needed by Japan."

★ ★ ★

ARE YOU BUYING YOUR SHARE OF BONDS?

The new Allis-Chalmers sickle-bar mower for highway and airport service.

New Highway Mower By Allis-Chalmers

A new heavy-duty, general-purpose sickle-bar mower for highway, airport and miscellaneous service has been announced by Allis-Chalmers Mfg. Co., Milwaukee, Wis. Mounted as a unit on a Model B Allis-Chalmers rubber-tired wheel tractor, it has a variety of travel speeds for all conditions, and stability for operations on extreme slopes and difficult angles.

The 5-foot heavy-duty cutter bar is within the full view of the operator, and is easily raised and lowered by a power hydraulic lift. The inner shoe is located outside the rear wheels and can be raised 12 inches by a hand lever. The sickle delivers a full cutting stroke through a wide range of positions from 45 degrees below horizontal to 60 degrees above for highway mowing, cutting slopes and banks, hedges and shoulders. To insure protection for the sickle when obstructions are encountered accidentally, the belt drive slippage provides a safety relief. The mower design leaves the drawbar open, enabling the tractor to pull gang-mowers or other equipment without removing the cutter bar.

Complete specifications for this new Model B general-purpose mower may be secured direct from the Tractor Division, Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Please mention this illustrated item.

"Shot Guide" Available; Aid in Applying Bitumen

A handy Shot Guide, operating similarly to a slide rule, for determining the application rate of tar or asphalt in gallons per square yard for different spray-bar lengths, and at various truck speeds in feet per minute in relation to the pump capacity in gallons per minute, is available to users of bituminous equipment by writing direct to Littleford Bros., Inc., 485 E. Pearl St., Cincinnati 2, Ohio. In addition, this pocket-size guide also offers in convenient table form the various grades of bituminous material recommended for different types of work, with the proper application temperatures.

New Building Erected By Caterpillar Dealer

Representatives of Vermont industrial, business, professional and civic groups attended the brief but impressive ceremonies which marked the cornerstone laying of the new quarters under construction by the Casellini-Venable Corp., Barre, Vt., distributor for the Caterpillar Tractor Co. The new building, of steel and brick granted by WPB authority, will be 138 feet long in front and 157 feet in depth, and is expected to be ready for occupancy by May. It marks the steady expansion of this dealer company, which was established in 1929 and handles road and quarry equipment as well as supplies for contractors and municipalities.

"Cold-Working" Process Makes This Steel 2½ to 5 Times Tougher — Stands the Bending that Makes Ordinary Shovels Break

Advances in metallurgy have enabled us to improve the strongest light shovels on the market. With their famous "backbone" construction that thickens and strengthens all points of wear and stress, and their steel now "Surface Peened," RAZOR-BACK Shovels are even tougher, longer-lived than before. *Send for Catalog and prices.*

THE UNION FORK & HOE COMPANY
664 Hocking Street, Columbus 15, Ohio

Standard tests of the American Society for Testing Materials show how RAZOR-BACK "Surface peened" steel ("A") withstands continuous 2-way bending longer than fine heat-treated steel —
2½ times longer at extreme of 90,000 lbs. per sq. in.
5 times longer at 80,000 lbs.
Unlimited at 70,000 lbs.

NOTE BACKBONE
17 Ga. 13 Ga. 17 Ga.
Thick center extends full length from the cutting edge; takes the wear and stress. Tapered sides save weight.

ALSO MAKERS OF STONE, BALLAST AND INDUSTRIAL FORKS — ASPHALT AND ROAD RAKES

7½ MILLION CUBIC YARDS OF TOUGH OVERBURDEN "NON-STOP"

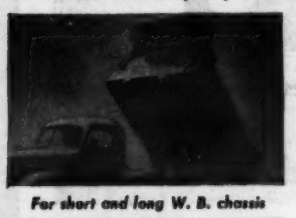
25-CUBIC-YARD PAGE *Automatic* AT WORK

The first 25-cubic-yard dragline bucket is a Page Automatic owned by the Northern Illinois Coal Corporation. It is shown at work, and below after its non-stop run of 7½ million cubic yards when it was sent to the yard for its first reconditioning.

SAME PAGE AUTOMATIC AFTER 7½ MILLION CUBIC YARDS OF STRENUOUS WORKOUT

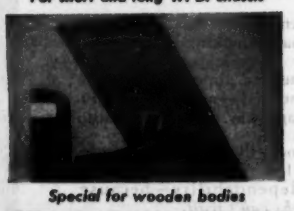
PAGE ENGINEERING COMPANY · CHICAGO 38, ILLINOIS

Six wheelers and heavy duty trucks



For short and long W. B. chassis

"SUPER" HYDRAULIC HOIST DUMP BODIES
sizes 5 to 30 ton capacity.



Special for wooden bodies

MODEL "ZB" PLATFORM HOISTS
make dump bodies out of flatbed, stake, or grain bodies.

Solves manpower problem

"LIFT GATE"
HYDRAULIC tailgate lift for loading truck Van Bodies, platform bodies, etc.

ONE MAN DOES THE WORK OF THREE!

Write or wire for literature and prices • Nation-wide Sales and Service

ANTHONY CO.
STREATOR, ILLINOIS

ARMY E NAVY

Buy A Share In America

Lend a HELPING HAND with your WAR BONDS

Long Approach Fills For Montana Bridge

Sandy Loam Used at Fallon Permitted Good Compaction: Crushed-Gravel Base and Mat to Be Completed in 1945

+ CONSTRUCTION on a new location of a bridge across the Yellowstone River near Fallon, Mont., to replace one destroyed by ice in 1943, (See C. & E. M., December, 1944, pg. 17), necessitated new approaches at both ends, totaling 2.162 miles in length. A contract for the work was undertaken in 1944 by Stanley H. Arkwright, Inc., of Billings, Mont., with surfacing to be completed in 1945. Heavy fills, the material for which was obtained from borrow pits located ½ mile from the bridge ends, required the hauling of 224,729 cubic yards of borrow on which the contractor's progress was retarded by his inability to obtain larger hauling units.

Earth Moving and Compaction

The fill, built to a subgrade width of 51½ feet with 4 to 1 slopes on the portion under 5 feet in height and 2 to 1 slopes on the higher fills, was constructed in 8-inch layers, with the dirt delivered from borrow pits approximately 2,400 feet from the bridge ends by one 14-cubic-yard and two 11-cubic-yard LeTourneau scrapers pulled by Caterpillar D8 tractors, with a LeTourneau bulldozer on a fourth D8 used as a pusher and cut plow. The 8-inch lifts were spread by a Caterpillar No. 12 motor grader while an Allis-Chalmers 90 tractor pulled two 8-foot sheepsfoot rollers loaded to a weight of 12 tons each. The daily yardage placed in an 8-hour shift was 1,250 cubic yards.

The soil, a sandy loam classified as A-4 and with an average moisture content of 9.5 per cent, was compacted to 103 per cent of its original density by about ten passes of the sheepsfoot roller over each lift. However, because of the porous nature of the soil and the dry atmosphere, it was necessary to apply 60,000 gallons of water per day, hauled in a 1,600-gallon tank on a 1½-ton truck from an artesian-well-fed reservoir nearby where a 3-inch centrifugal pump was located to fill the tank. It was necessary to start the watering early and continue it for about 16 hours to supply the needed moisture. Since there were almost that many hours of daylight during the summer in that latitude, no lights were required for the watering operations. A Gray Convoy Luber on a Ford truck provided field lubrication of all equipment.

Surfacing

Plans contemplate a final surface of a 6-inch compacted layer of selected material followed by a 6-inch compacted course of crushed gravel. The material for this work will be crushed from rock or gravel having a loss of not more than 40 per cent when subjected to 500 revolutions of the Los Angeles Rattler abrasion machine and with the following gradation:

Passing	Percentages by Weight Passing Square-Mesh Sieves AASHO T-27
2-inch sieve	100
1½-inch sieve	70-100
1-inch sieve	55-85
¾-inch sieve	50-80
⅜-inch sieve	40-70
No. 4 sieve	30-60
No. 10 sieve	20-50
No. 40 sieve	10-30
No. 200 sieve	5-15

On top of this base course will be a 2-inch mat of crushed gravel and 150 to 200-penetration paving asphalt on a prime coat of MC-2.

The top-course material must pass the same specifications for abrasion as the base course and have the following gradation:

Passing	Percentages by Weight Passing Square-Mesh Sieves AASHO T-27
1-inch sieve	100
¾-inch sieve	85-100
No. 4 sieve	45-65
No. 10 sieve	30-50
No. 200 sieve	5-10

Since it would not be possible to complete the grading and surfacing during the short construction season of 1944, sufficient time was allowed under the contract so that the surfacing can be done in the summer of 1945.

Personnel

The contract for the grading, surfacing, and construction of small drainage structures on the approach roads to a new bridge over the Yellowstone River near Fallon, Mont., was awarded to Stanley H. Arkwright, Inc., Billings, Mont., by the Montana Highway Commission on May 29, 1944, on his bid price of $108,408.55, with a specified completion date of June 30, 1945. R. A. Haffner is Superintendent for the contractor, and Joseph R. Rountree, Project Engineer for the Montana Highway Commission.

Fletcher Joins Staff Of Timber Engineering Co.

The Timber Engineering Co., Washington, D. C., maker of Teco timber connectors, has announced the appointment of Robert L. Fletcher to its engineering staff. Mr. Fletcher recently returned from five years' overseas service as a civilian engineer with the Army Engineers, supervising the construction of airfields, hangars, roads, and fortifications, and before that time was connected with the Constructing Quartermaster office of the Army, doing engineering and estimating work on new construction projects.

»» For HOSE BOOTS, CLOTHING or PUMP DIAPHRAGMS

Call YOUR Continental BRANCH

Immediate Delivery from Local Stock

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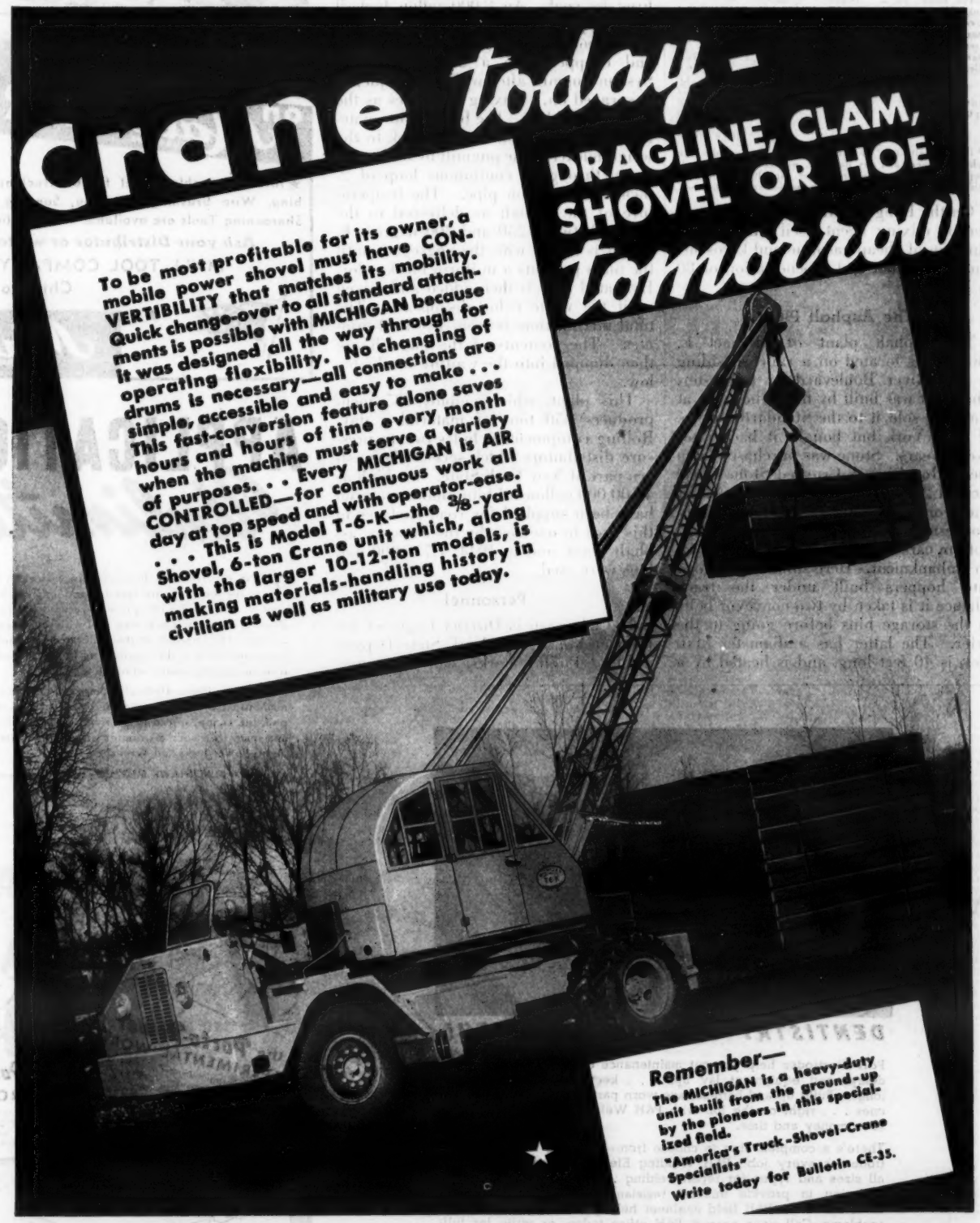
Baltimore, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Dayton, Detroit, Indianapolis, Kansas City, Los Angeles, Memphis, Milwaukee, New York, Philadelphia, Pittsburgh, Rochester, San Francisco, St. Louis

CONTINENTAL RUBBER WORKS
ERIE, PENNSYLVANIA, U•S•A

Crane today - DRAGLINE, CLAM, SHOVEL OR HOE tomorrow

To be most profitable for its owner, a mobile power shovel must have CONVERTIBILITY that matches its mobility. Quick change-over to all standard attachments is possible with MICHIGAN because it was designed all the way through for operating flexibility. No changing of drums is necessary—all connections are simple, accessible and easy to make . . . This fast-conversion feature alone saves hours and hours of time every month when the machine must serve a variety of purposes. . . Every MICHIGAN is AIR CONTROLLED—for continuous work all day at top speed and with operator-ease. . . . This is Model T-6-K—the ⅜-yard Shovel, 6-ton Crane unit which, along with the larger 10-12-ton models, is making materials-handling history in civilian as well as military use today.



Remember—
The MICHIGAN is a heavy-duty unit built from the ground-up by the pioneers in this specialized field.
"America's Truck-Shovel-Crane Specialists"
Write today for Bulletin CE-35.

MICHIGAN
POWER SHOVEL COMPANY
BENTON HARBOR, MICHIGAN

Bituminous Macadam Salvages Pavement

(*Continued from page 79*)

Traffic was permitted on the bottom course about half an hour after rolling. The top course was laid two days after the paving of the bottom course and consisted of a 1-inch loose course which compacted under rolling to a solid ⅝ inch. A truckload of top-course material paved 225 feet of 10-foot width. Further consolidation and compaction of the two courses resulted in a final thickness of about 2¼ to 2½ inches. A total of 4,800 tons of material was used on the project.

The basic formula for the mixes used under the specification "Bituminous Macadam Mixing Method Type 3" is as follows:

Aggregate and Materials	Passing	Retained On (Screen)	Percentages Base Course	Top Course
Broken stone, No. 2	1-inch	½-inch	60	—
Broken stone, No. 1	½-inch	¼-inch	30	30.0
Screenings and/or sand, No. 1-A	¼-inch	⅛-inch	—	37
Screenings and/or sand, No. 1-B	⅛-inch	No. 20	4.5	12.0
Filler	20	80		6.0
	80	200		4.0
	200	—		3.2
Hydrated Lime			0.5	0.8
Asphalt*			5.0	7.0
			100.0	100.0

*The asphalt item of the basic formula includes the asphaltic cement and any liquefier, workability compound, tempering medium, powdered hard asphalt and flux oil which may be called for in each particular specification.

On the Elmgrove Road job, the liquefier or mixing agent used was a combination of cheap gasoline and kerosene, and the asphalt had a penetration of 80 to 100.

The Asphalt Plant

The asphalt plant of Michael E. Sweeney is located on a railroad siding at 612 River Boulevard in Rochester. The plant was built by the owner who at one time sold it to the Standard Oil Co. of New York but bought it back after twelve years. Stone was purchased from the LeRoy Lime & Crushed Stone Corp. located 20 miles away in LeRoy, N. Y., and from the Dolomite Products Co. in Rochester. It was delivered in hopper-bottom cars to a siding which is built on an embankment. Here stone is unloaded into hoppers built under the track whence it is taken by two conveyor belts to the storage bins before going to the drier. The latter has a diameter of 6 feet, is 40 feet long, and is heated by a Hauck fuel-oil and steam torch. The aggregate is heated not by the direct flame but by hot gases at temperatures of from 50 to 110 degrees F which drive off the surface moisture. When thoroughly dried, the stone is raised by a hot elevator to a triple-deck 4 x 8-foot pulsating screen, made by the Screen Equipment Co. of Buffalo, which delivers the No. 2, 1, 1-A and 1-B stone to separate bins.

Asphalt is purchased from the Socony-Vacuum Co. at Buffalo and is brought to the siding in tank cars and transports. Here again the height of the embankment siding is utilized, as the asphalt is unloaded by gravity from the cars to the asphalt storage tanks below. The temperature of the asphalt in the tank car is first brought to 250 degrees F by a Cleaver-Brooks portable tank-car heater mounted on a 4-wheel chassis. The asphalt is stored in twelve insulated tanks with varying capacities from 10,000 to 22,000 gallons each so that it is possible to store 200,000 gallons of asphalt. The temperature of the asphalt in these tanks is maintained at 250 degrees F by steam from a 150-hp Scotch marine boiler, fired by coal. An 8,000-gallon fuel-oil tank supplies the torch on the drier.

The hot mineral aggregate is weighed and dropped into a 2-ton Simplicity System pugmill after which the liquefier is sprayed on. Mixing continues as the asphalt is added. The bituminous material is pumped from storage tank to the weigh bucket at the pugmill by an Etnyre pump through a continuous loop of 2-inch-diameter iron pipe. The temperature of the asphalt as delivered to the mix is between 250 and 300 degrees F, and it is mixed with the aggregate until the mass presents a uniform black color. Hydrated lime is then added and mixed until the white color disappears. The total mixing time is from 1½ to 2 minutes. The contents of the pugmill are then dumped into the waiting trucks below.

This plant, which employs 35 men, produces 350 tons of material a day. Rolling equipment includes twenty pressure distributors which service the western part of New York State. As high as 4,500,000 gallons of bituminous material have been supplied for road surfaces in this area in one year by the Sweeney asphalt plant, and in 1944, 1,750,000 gallons were used.

Personnel

E. C. Lawton is District Engineer for District No. 4, New York State Department of Public Works, with headquarters in Rochester. H. L. Michael is Assistant District Engineer. James A. Small is County Assistant to the District Engineer for Monroe County in which the Elmgrove Road job was located. Michael E. Sweeney is in charge of operations at his asphalt plant.

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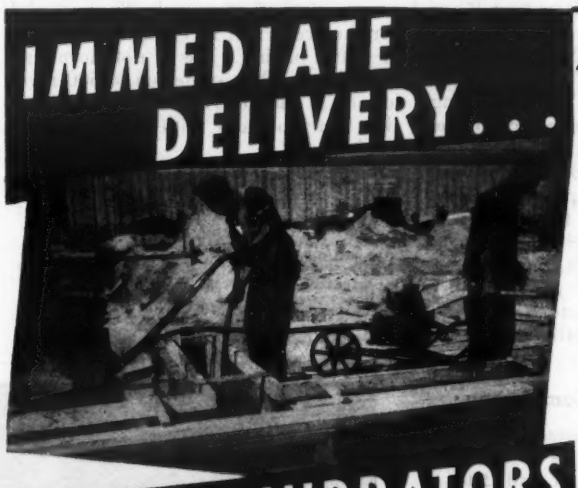

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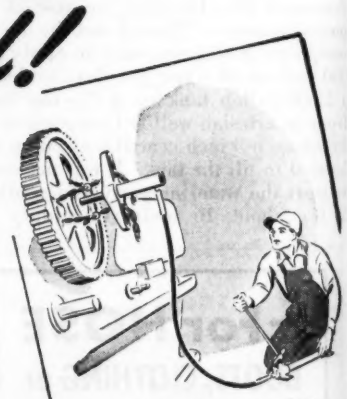

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BLACKHAWK

Present and Future Highways in Britain

Maj. Gen. Philip B. Fleming Reports To ARBA 42nd Annual Meeting in Chicago on Visit to England

✦ IN England during the summer of 1944, Major General Philip B. Fleming, Federal Works Administrator, had an opportunity to examine British plans for post-war road development. It can scarcely be said, he reports, that our British cousins have much to teach us about highway building, as their roads are, for the most part, narrow and winding, with poor visibility. There is much so-called "ribbon" development, with highways running through little villages whose houses snuggle up on either side. In several ways, however, our British cousins are planning well for the future of highway construction, as they were cognizant in 1938, just before the war, that there was real need for planning.

In that year a select committee of the House of Lords reported that the number of automobiles in use was increasing at the rate of about a thousand a day, and predicted that "within the next decade a total may be reached which the roads of the country will be quite unable to carry". The war, of course, has invalidated that prediction, but probably has merely extended for a few years the saturation point.

Plans for Motorways

The Royal Automobile Club and its affiliated bodies are now urging the construction of a system of motorways for the exclusive use of motor vehicles, to be built and maintained out of national funds. The specifications are:

"The motorways should not contain any intersections, not even of the roundabout type. Road intersections, besides being a cause of major traffic delay, with the consequent waste of human and vehicle time, also contribute materially to the number of accidents. Arrangements for two roads, which would otherwise intersect, to pass over or under one another so that the traffic upon them does not meet, is the only complete solution for the dangers and delays of intersection. Access to and exit from the new motorways should be only of this type. At no point would a driver encounter another vehicle or pedestrian (for whom ramped subways must be provided) crossing his path, nor would he be impeded by a vehicle entering or leaving the road. The design of these junctions should be such that all traffic would be able to enter, proceed, or turn off without crossing the paths of other traffic. All traffic should be enabled to adjust its speed on entering or leaving the motorway by the provision of acceleration and deceleration lanes."

Gen. Fleming points out that the British Isles offer a virgin field for this type of development. Some excellent new highways were built in certain coastal areas to facilitate preparations for the invasion of the continent on D-Day, but elsewhere British roads show the same effects of wartime deterioration as do our own, with little new construction of any consequence beyond that dictated by the necessities of war.

In one respect Britain has a marked advantage in planning a really modern system for highway transport. German aviators who came over during the blitz naturally sought out road intersections as strategic targets, with the result that abutting buildings were demolished from a large number of them. It is being urged now that these buildings be not replaced so that the space they occupied can be used in road developments to eliminate future hazards.

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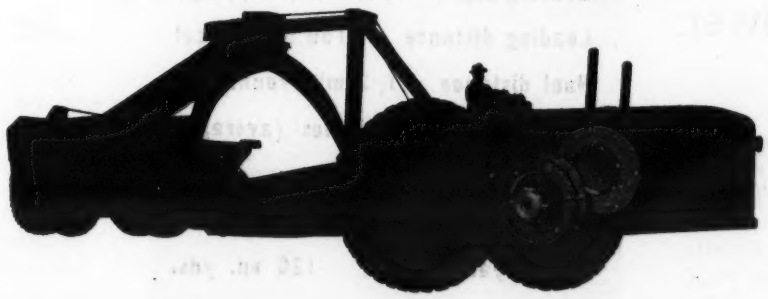

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Like McVaugh-Haynes Co., and many other successful contractors, you will find Tournapull earthmoving faster and cheaper. Try it!

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To begin with, Tournapulls cost you $500 to $7000 less than crawler-scraper rigs of comparable hourly capacity. What's more, your Super C Tournapull lugs but 207 pounds per horsepower, while each horsepower in a crawler-scraper unit of the same 15-yard capacity has to budge 411 pounds.

You get the same one-man loading, hauling and spreading efficiency. But Tournapull speed is 2 to 3 times faster than the fastest crawling tractor, thus making profitable any haul from 300′ to 3 or more miles. And Tournapull design concentrates weight and power on two big (5′6″ outside diameter, 24″ wide) rubber-tired drive wheels to give you greater traction, maximum flotation and quick turning.

Time Study

Material	sod and black dirt
Loading time	50 seconds (average)
Loading depth	3 inches (stripping)
Loading distance	150 to 200 feet
Haul distance	1/2 mile round trip
Cycle time	6 minutes (average)
Round trips per hour	ten
Estimated load per trip	12 cu. yds.
Hourly yardage	120 cu. yds.

Tournapull stripping 3 inches of top soil gets heaping loads like this in 50 seconds. No waiting at shovel. Tournapulls used here travelled under their own power 750 miles from Dawson Creek to Matson Lake, were later brought back to Peoria and reconditioned. They travelled the 150 miles via highway from Peoria to Dubuque in about 15 hours.

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Why use slow-moving crawler equipment or one-purpose loading and hauling rigs, when you can move more yardage farther, faster and more profitably with Tournapulls. See your LeTourneau Distributor . . . he can help you get new Tournapulls NOW for essential jobs or reconditioned Tournapulls for low-priority work.

Tournapull stockpiling top soil for future use on Dubuque airport. In addition to 10 Tournapulls, on this job McVaugh-Haynes uses 8 tractor-drawn LeTourneau Carryalls for short-haul earth-moving, 4 LeTourneau Dozers, and a Rooter.

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